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ABSTRACT

Graduate and professional education in the United States is reviewed, with particular emphasis on recent trends in doctoral study in the arts, sciences, humanities, and engineering. Master's programs and the professions are also considered. In examining the range and diversity of graduate education, attention is directed to the size of graduate education, the kinds of programs, degrees, and graduate institutions, as well as the characteristics of graduate students. Other specific concerns are as follows: (1) trends in applications, enrollment, and degrees conferred over the past decade, with special attention to trends for men and women and part-time students and foreign students; (2) differences in the trends observed for professional programs, and differences among academic disciplines, particularly at the doctoral level; and (3) patterns of financial support, particularly for doctoral students, including fellowships, assistantships, loans and the major sources of support (e.g., federal, state, institutional, and private). Finally, the major sources of information on graduate and professional education are considered, and recommendations regarding data collection and analysis are offered. Trend data and approximately 50 references are appended. (SW)

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GRADUATE AND PROFESSIONAL EDUCATION

A REVIEW OF RECENT TRENDS

Prepared for the National Commission on Student Financial Assistance

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INTRODUCTION

This paper, prepared for the National Commission on Student Financial Assistance, describes the terrain of graduate and professional education in the United States. In the paper, we give particular attention to recent trends in doctoral study in the arts, sciences, humanities, and engineering; but we also discuss trends in graduate education more broadly defined -- including Master's programs and the professions.

The paper is divided into six sections, organized as follows:

Section I. The Context of Graduate and Professional Education. In this section, we describe the range and diversity of graduate education in the United States. The section includes a discussion of the size of graduate education, a description of the kinds of programs, degrees, and graduate institutions, and a discussion of the characteristics of students enrolled in graduate school.

Section II. Aggregate Trends. This section presents trends in applications, enrollment, and degrees conferred over the past decade, giving special attention to trends for men and women, full and part-time students, and foreign students.

Section III. Trends for Different Fields of Study. This section concentrates on differences in the trends observed for professional programs, as well as differences among academic disciplines, particularly at the doctoral level.

Section IV. Financial Support. This section focusses on patterns of financial support, particularly for doctoral students. It describes the major types of graduate student support (e.g. fellowships, assistantships, loans), as well as the major sources of support (such as federal, state, institutional, and private).

Section V. Sources and Quality of the Data. In this section, we discuss the major sources of information on graduate and professional education used in preparing the paper, and we present some observations concerning the strengths and limits of the data.

Section VI. Recommendations. In this final section, we present two sets of recommendations to the Commission: recommendations, concerning the analysis of existing and soon-to-be-available data; and recommendations for the collection of new data.

Within each section of the paper, we have attempted to provide as much detail as possible on the terrain of graduate education, given the constraints of time and the unevenness of the data. To place this information in perspective, it is useful to provide an overview of some of the major trends.

I. The Context of Graduate and Professional Education.

A. Graduate and professional education is diverse, in types of degrees, kinds of programs, and students served. Of the 3,000-plus institutions of higher education in the United States, about 1,000 offer graduate and professional programs. There are more than 300 doctorate-granting institutions, offering both doctorates and Master's degrees, and 700 Master's-granting institutions. Of the roughly 1,000 institutions offering graduate and professional education, more than 600 have graduate programs in education, 500 in business, 175 in law, and 100 in medicine.

B. Roughly half of the nation's college graduates eventually pursue some form of graduate education.

II. Aggregate Trends.

A. The number of doctorates awarded each year reached a peak of about 34,000 in 1972-73, and it has declined by roughly 2,000 since then.

B. The number of Master's degrees awarded each year reached a peak of about 318,000 in 1976-77, and it has declined by more than 15,000 since then.

C. The number of first-professional degrees[1] awarded each year (primarily degrees in medicine and law) has increased throughout the decade, and it is expected to increase somewhat beyond the number currently granted (about 70,000).

D. More than half of the students in Master's and doctoral programs are enrolled part-time. First-professional enrollment, however, remains predominantly full-time.

E. According to two indicators of demand for graduate education (number of applications and admissions test volume), the demand for graduate education has declined somewhat since the mid-seventies.

F. The proportion of women among graduate students has risen steadily over the past decade, from about 40% to nearly 50%.

G. Foreign students constitute an increasing proportion of graduate enrollment and degrees conferred, and, if trends in undergraduate education are any indication, this proportion is likely to continue to

1. See page 6 for definition of first-professional.

grow. Foreign participation appears particularly large in certain disciplines -- for example, engineering, the sciences, and economics.

III. Trends for Different Fields of Study.

A. Trends in enrollment and degrees granted differ across graduate disciplines. In the biological sciences, enrollments and graduate degrees have increased over the past decade, while, in the physical sciences, they have declined. In engineering, enrollments have increased, but the number of doctorates granted has declined. The humanities have remained stable, while the pattern in the social sciences is mixed.

IV. Financial Support

A. While doctoral students continue to be supported by a combination of forms of aid, the relative shares of these forms of support have shifted over the past decade. Federally-sponsored fellowships, traineeships, and assistantships have declined. Private foundation fellowships have declined and, in some cases, disappeared.

B. Universities have partially compensated for the decline in federal and private foundation fellowships by committing a larger portion of institutional funds to graduate student support. In addition, federal work-study funds have increasingly been applied toward the support of eligible graduate students.

C. Graduate student participation in federally-guaranteed student loan programs has increased, and the cumulative loan debts incurred by graduate students have increased.

V. Sources and Quality of the Data

A. While a surprising amount of data is collected pertaining to graduate education, insufficient effort has been devoted to organizing the data in a form useful for policy purposes. In addition, inconsistencies from year to year and across data sources make it difficult to draw inferences about trends over time.

The reader will notice references throughout the paper to another paper prepared for the Commission, "Financial Issues in Graduate Education and An Agenda for Research" by Raymond Anderson (Columbia University) and Allen Sanderson (Princeton University). Although the two papers were written separately, they are intended to complement each other. This paper provides a context for the consideration of financial support issues in graduate

education, while the Anderson/Sanderson paper discusses the issues underlying financial support in much greater depth. We suggest that the reader refer to the Anderson/Sanderson paper for additional information in this area.

I. THE CONTEXT OF GRADUATE AND PROFESSIONAL EDUCATION

More than half of the students who earn Bachelor's degrees in the United States subsequently attend some form of graduate school, and more than forty percent eventually earn a graduate degree. During the 1978-79 academic year, 301,079 students earned Master's degrees, 32,730 earned doctorates, and 68,848 earned first professional degrees. (Digest of Educational Statistics, 1981, Table 109.)

Graduate education includes a wide-ranging collection of institutions and programs. Indeed, of the roughly 3,000 colleges and universities in the United States, more than 1,000 offer some form of graduate education. (Digest of Educational Statistics, 1981, Table 103.)

Broadly speaking, most graduate programs are primarily involved in one (or more) of the following endeavors:

1.) They prepare students for careers in the professions (such as law, medicine, elementary and secondary teaching, or engineering);

2.) They prepare students for careers in research;

3.) They prepare students for careers as college or university professors;

4.) They engage in the advancement of knowledge through basic and applied research; and

5.) They participate in undergraduate instruction.

Some programs -- for example programs in law or business -- are mainly designed to prepare professionals. Other programs -- for example, programs in physics or English literature -- are primarily designed to prepare university professors and to engage in research. But the distinction between professional and "academic" graduate programs is not nearly as clear as it appears at first glance. For example, medical schools, commonly described as professional schools, routinely engage in basic research; and a fair number of the graduates of medical schools

end up as university professors. At the same time, not all of the graduates of programs in physics or English -- especially those at the Master's degree level -- end up taking jobs as college professors. Thus, the terrain of graduate education is diverse.

This diversity in graduate programs is reflected in the diversity of the degrees awarded. At the most general level, graduate programs offer two basic kinds of degrees: Master's Degrees, and Doctor's Degrees. But each type of degree includes a bewildering number of sub-types. For example, some of the more common Master's degrees include: Master of Arts, Master of Science, Master of Business Administration, Master of Social Work, Master of Public Administration, and Master of Arts in Teaching. There are somewhat fewer kinds of Doctor's degrees, but the numbers are still impressive: for example, Doctor of Philosophy, Doctor of Education, Doctor of Business Administration, Doctor of Medicine, Doctor of Jurisprudence, and Doctor of Dental Surgery. There are also a small number of degrees which do not contain the name "Master's" or "Doctor's," but are nevertheless graduate degrees. For example, a number of universities grant a professional Engineer's degree, which falls between the Master's and doctorate level in engineering.

Mainly for historical reasons, statistics on graduate education are usually reported separately for two types of programs: (1) programs leading to a Master's degree or doctorate; and (2) programs leading to a first-professional degree. For simplicity, these two categories are often called graduate programs, and first-professional programs, even though, broadly speaking, both are at the graduate level. The first-professional degree category includes some -- but by no means all -- of the programs commonly described as professional. For example, it includes law, medicine, dentistry, and theology, but it does not include business, education, or engineering. Although this reporting convention is somewhat arbitrary, we will begin by using it in our discussion, so that the data

we present can be compared directly to additional statistics reported elsewhere. In Section III, we will present a more systematic comparison of professional and academic degrees programs.

About 1,300,000 students are currently enrolled in graduate programs, and an additional 250,000 are enrolled in first-professional programs. (See Appendix C, Table 1, for more detailed enrollment statistics.) Of the 1,300,000 students in graduate school, roughly 1,050,000 have been admitted to programs leading to a Master's degree or doctorate. The remaining 250,000 students are pursuing graduate coursework but are not enrolled in programs leading to a graduate degree.

About half the students enrolled in graduate programs are women, and more than sixty percent of the students are enrolled part-time. About six percent of graduate students are Black, and a little over two percent are Hispanic. About one third of all graduate students are enrolled in private institutions.

First-professional degree programs enroll a smaller proportion of women and part-time students than do graduate programs. Of the 250,000 students currently enrolled in first-professional degree programs, about twenty-five percent are women, and about ten percent are part-time, a little over four percent are Black and about three percent are Hispanic. More than sixty percent of all first-professional students are enrolled in private institutions.

Tables 2 and 3 in Appendix C present some information on the number of institutions with graduate and first-professional programs in particular fields of study. About 140 institutions offer doctorates in mathematics, 150 in letters (the humanities), 190 in the physical sciences, and 210 in the biological sciences. More than 600 institutions currently offer Master's degrees in education. (Most Master's degrees in education are given to students intending to pursue a career in teaching.) Roughly 500 offer Master's degrees in business. About 175 institutions grant professional law degrees (the LL.B. or J.D.), and about

110 grant professional degrees in medicine (the M.D.).

Institutions offering graduate and first-professional programs can be classified in a number of ways. One simple classification is according to highest degree conferred. Of the roughly 1000 institutions with graduate and professional programs, somewhat more than 300 are doctorate-granting institutions, offering both Master's and doctorates. The remaining 700 offer Master's degrees.

Doctoral Programs

Within the broad category of doctorate-granting institutions, there is a substantial range of universities. One common way of describing these universities is according to a classification system developed by the Carnegie Commission on Higher Education in 1970. The Carnegie Commission divided the doctoral-granting universities into four categories:

Research Universities I
Research Universities II
Doctoral-Granting Universities I
Doctoral-Granting Universities II

The first category -- (Research Universities I) -- includes roughly 50 leading universities in terms of federal financial support of academic science. The second category -- (Research Universities II) -- includes roughly the next 40 universities in terms of federal science support. The third category -- (Doctoral-Granting I) -- includes universities that award at least 40 doctorates a year; and the fourth category -- (Doctoral-Granting II) -- includes universities that award at least 10 doctorates a year. (See Carnegie Commission, A Classification of Institutions of Higher Education, 1973, for a precise definition of each category.)

The 52 universities included in Research Universities I together grant about half of all the doctorates awarded each year. The 40 universities included in Research Universities II together grant an additional quarter of the doctorates awarded each year. The more than 200 remaining doctoral-granting univer-

sities (those included in Doctoral-Granting I and II) together grant the remaining quarter of the doctorates awarded each year. (National Research Council, Doctorate Recipients from Unites States Universities, Summary Report, 1977.)

The Carnegie classification is only one of several ways of classifying doctoral-granting institutions. Anderson and Sanderson, in their paper prepared for the Commission, suggest a three-part classification based on market segmentation: major research universities that draw on a national pool of doctoral applicants; major research universities that draw on a regional pool; and other universities.

Several other organizations, for example the National Center of Higher Education Management Systems (NCHEMS), have proposed additional methods of classifying universities -- but, however they are classified, a small number of institutions grant a large proportion of the doctorates awarded each year. For example, in 1978-79, the University of California at Berkeley awarded more than 700, and seven universities awarded 500 or more. (See Appendix C, Table 4.)

Doctoral programs usually require students to complete at least two years of course work, followed by an extended original research project culminating in the preparation of a dissertation. At a minimum, this generally requires at least three years -- but most students need four or five years to finish. On the average, students who earn doctorates receive them more than nine years after they received their Bachelor's degrees. The time elapsed between Bachelor's and Doctor's degrees varies a good deal by gender and field of study. (See Table 5, Appendix C.)

As we mentioned earlier, doctoral programs in medicine, dentistry, theology, law and a few other so-called "first-professional" fields are usually considered separately from the other doctoral degree programs. One characteristic these first-professional programs share is that most are much more highly structured

than typical doctoral programs in arts and sciences -- or for that matter, in engineering or education. In general, students who enter law school can count on a three year stay, while those who enter medical school know that it takes four years to earn an M.D. The length of stay in doctoral programs in other fields is generally much less predictable.

In 1978-79, 5,434 professional degrees were awarded in dentistry, 14,786 in medicine, and 35,206 in law (L.L.B. or J.D.). (Digest of Educational Statistics, 1981, Table 114.) It is interesting to observe that more degrees were awarded in law than the total number of doctorates awarded in all fields outside the first professions.

Master's Programs

Programs leading to a Master's degree usually require one or two years of work following the Bachelor's degree. The most common Master's programs are designed to prepare students for the professions. For example, of the roughly 300,000 Master's degrees granted each year, about one third are in education, and one sixth are in business administration. Master's programs are also offered in such professional fields as social work, public administration, and engineering, as well as in the regular academic disciplines.

About 1000 institutions offer the Master's degree, and thus the average number of Master's degrees awarded per graduate institution is about 300. But many universities award many times that number. For example, New York University grants roughly 4,000 Master's degrees each year, about 15 universities grant more than 2000, and 56 grant between 1000 and 2000. (See Appendix C, Table 6.) While many of the major doctorate-granting universities grant a large number of Master's degrees, some large Master's granting institutions -- for example, San Francisco State University and the City University of New York, Queen's College -- grant few doctorates, or none at all.

II. AGGREGATE TRENDS IN GRADUATE EDUCATION

The first Ph.D. granted in the United States was awarded by Yale University in 1861. Since then, the number of students enrolling in graduate school and receiving advanced degrees has grown at a rapid pace, doubling every five or ten years until the early 1970's. This substantial growth in graduate education was due in part to the rapid growth in the population of the United States. But it was also due in part to the rising proportion of young people completing high school and attending and completing college.

By the early seventies, roughly 75 percent of all eighteen-year-olds completed high school each year, and roughly 25 percent of all young people earned Bachelor's degrees. (Statistical Abstract of the United States, 1981, Table 264)

In the mid-seventies, however, the long-term growth in the number of Bachelor's degrees awarded each year came to an end. The reasons for this shift are partly demographic: The number of young people of college age, which had grown rapidly for several decades, reached a peak in about 1979. The number of eighteen-year-olds has declined since then, and it will continue to fall for roughly the next fifteen years.

There is, in addition, a second reason for the shift in Bachelor's degrees granted in the mid-seventies: The proportion of young men completing high school and attending and completing college began to decline. (At the same time, however, the proportion of young women attending and completing college has continued to increase.)

The turning point in the number of Bachelor's degrees granted each year has been accompanied by a decline in the proportion of college-graduates enrolling in graduate school, and an increase in the proportion of college graduates enrolling in professional programs. Taken together, these trends have resulted in a

fairly substantial decline in the number of applications to graduate school in the late seventies. The Council of Graduate Schools (CGS), which includes about 365 graduate institutions, has collected annual information on the number of applications for graduate study received by its member institutions since 1971. According to the Council survey, each member university received an average of 2,285 applications for graduate study in 1974. (See Tables 7-8, Appendix C.) By 1981, the average number of applications each received had fallen to 1,764. While these numbers must be interpreted with some caution, since the samples involved shifted somewhat from year to year, they do suggest a decline in applications to graduate school at Council institutions.

Trends in applications differ for different types of graduate institutions. The COFHE graduate research project has reanalyzed the CGS data for about 20 major research universities, and, while applications have fallen at these major research universities, the fall-off is not as substantial as the decline for all CGS schools. (For a list of institutions included in the COFHE study, see Table 11, Appendix C.) At COFHE institutions, the average number of applications per institution declined from about 5900 in 1975 to about 5400 in 1980. (See Table 8, Appendix C.)

While applications to graduate school have fallen, enrollment of new students has not fallen as rapidly. The average number of entering graduate students at Council institutions fell from 688 in 1974 to 543 in 1981. There is some indication that the number of entering graduate students has declined somewhat less rapidly at major research universities. For example, entering graduate student enrollment at COFHE project institutions has declined from about 1000 in 1974 to about 950 in 1980. (See Tables 9-10, Appendix C.)

Systematic data on applications and entering graduate enrollment are not available on a national level.[2] Data are available, however, for total enrollment in graduate and professional school. At the national level, total graduate

enrollment grew in the early part of the decade, reaching a peak in 1976, and it has declined somewhat since then. First-professional enrollment, on the other hand, has grown steadily over the last decade, from about 150,000 in 1968, to about 250,000 in 1978. (See Figure 1, Appendix C.)

The trends in graduate enrollment differ substantially for men and women, for full and part-time students, and for public and private institutions. Indeed, much of the growth in enrollment that occurred in the first half of the decade occurred among women and among part-time students in public institutions. For example, from 1968-78, the number of men in graduate school increased from about 550,000 to about 680,000, while the increase for women was much more substantial (from about 325,000 to about 630,000). While full-time enrollment grew rather slowly (from about 350,000 to about 425,000) part-time enrollment grew dramatically, from about 550,000 to 850,000. Enrollment in private institutions grew slowly, from about 300,00 to about 420,000; enrollment in public institutions grew from about 600,000 to almost 900,000. (See Figures 2-4, Appendix C. See Figures 5-7 in Appendix C for similar data on enrollment in first-professional schools.)

National data are also available on the number of graduate and professional degrees awarded each year. According to NCES statistics, the number of doctorates awarded each year reach a peak of a little over 34,000 in 1973, and it has fallen by roughly 2000 since then. (See Table 12 in Appendix C.)

Like the trends in graduate enrollment, the trends in the production of doctorates are the result of two somewhat different patterns: one for men, and one for women. The number of doctorates earned by men each year peaked at roughly 28,500 in 1973, and since then it has fallen by almost 5,000. The number of doctorates earned by women, on the other hand, has continued to increase, although some projections indicate that the number may begin to fall in the eighties.

The picture for Master's degrees is fairly similar. The number of Master's

degrees awarded each year reached a peak in 1977, at about 318,000, and it has declined by about 15,000 since then. (See Table 13 in Appendix C.)

The pattern for first-professional degrees is somewhat different. The total number of first-professional degrees (primarily in medicine, law, dentistry, and theology)has risen steadily over the sixties and seventies, for both men and women, and the number is not expected to fall noticeably in the near future. (See Table 14, Appendix C.)

Unfortunately, statistics on degrees awarded by ethnicity were not collected in a systematic fashion until the mid-seventies, and thus it is difficult to draw precise inferences about long-term trends in graduate degrees by ethnicity. In 1975-76, about 3.3 percent of all doctorates granted were earned by Blacks, about 6.6 percent of all Master's degrees, and about 4.3 percent of all first-professional degrees. About 1.2 percent of all doctorates, 2 percent of all Master's degrees, and 2.4 percent of all first-professional degrees were earned by Hispanics. Since the mid-seventies, the proportion of Black and Hispanic degree recipients has remained about constant. (See Table 15, Appendix C.)

In the last two decades, there has been a fairly substantial increase in the degrees granted to foreign students holding temporary visas, especially for men in the sciences and engineering. In 1968, about 10 percent of all doctorates were awarded to non-resident aliens. (See Table 16 in Appendix C.) By 1968, this percentage had risen to about 12 percent. For men, the percentage of doctorates granted to non-resident aliens rose from about 10 percent to almost 15 percent over the decade, while for women it declined from about 6 percent to about 5 percent.

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2 The National Center for Education Statistics collects data on "first-year" graduate students, -- that is, students who have completed less than a full year of graduate course work. However, it is estimated that more than half of these "first-year" students have been enrolled for more than a year, but have not yet completed a full year of courses. See Allan Carter, Ph.D.'s and the Academic Labor Market.

III. TRENDS IN DEGREES AWARDED FOR DIFFERENT FIELDS OF STUDY

While the total number of Master's degrees and doctorates granted each year reached a peak in the seventies and has declined over the past few years, the pattern differs substantially for males and females, as we observed above. In addition, there are dramatic differences among different fields of study, at the Master's and doctoral levels, as well as in first-professional degrees. Furthermore, there have been important shifts in the fields of study pursued by undergraduates -- and, since college graduates who go on to graduate school tend to select fields of study related to their undergraduate major, these shifts have some important implications for graduate education.

To summarize some of the more important shifts in the fields of study chosen by undergraduate and graduate students, we have prepared several graphs, displaying the number of degrees granted at the Bachelor's, Master's, and doctoral levels, over the period 1968-69 through 1978-79 classified as follows (See Figures 8-19 in Appendix C.):

Social Sciences	Life Sciences
Humanities	Business
Mathematics and Physics	Education
Engineering	Other (not shown on the graphs)

We have also displayed the number of first-professional degrees granted, using the following classification scheme:

Medicine	Veterinary Science
Dentistry	Theology
Law	Other (not shown on the graphs)

One way to describe the shifts that have occurred in graduate and professional fields of study over the past decade is to compare what might be called the "academic" fields (for example, the humanities and the physical sciences) with the professional fields (for example, medicine and business). As we pointed out in Section I, it is difficult to establish a precise dividing line between

academic and professional fields, but for purposes of analysis, the following four degrees should surely be placed in the "academic" category:

Ph.D. in the Humanities
Ph.D. in the Physical Sciences
Ph.D. in the Life Sciences
Ph.D. in the Social Sciences.

Similarly, it is sensible to include the following four degrees in the professional category:

M.B.A. (Master of Business Administration)
M.A.T. (Master of Arts in Teaching)
M.D. (Doctor of Medicine)
L.L.D. or J.D. (Professional law degree)

The following Table, based on NCES data (Projections of Educational Statistics), indicates the number of degrees awarded in each of these fields, for 1968-69 and 1978-79.

Academic Doctorates	1968-69	1978-79
Humanities	3,000	3,600
Physical Sciences	5,000	3,800
Life Sciences	4,200	5,200
Social Sciences	4,600	6,600
Total	16,900	19,200
Professional Fields		
Business (M.B.A.)	18,300	47,000
Education (M.A.T.)	70,200	112,000
Medicine (M.D.)	11,400	20,200
Law (L.L.B. or J.D.)	17,000	35,200
Total	116,900	214,400
GRAND TOTAL (all 8 fields)	133,800	233,600

In 1968, of the 133,800 degrees granted in the eight fields in the classification, 16,900 were academic doctorates, and 116,900 were in the professions. Thus, in 1968, the number of academic doctorates was about 12.5 percent of the

total number of degrees awarded in the eight fields shown. By 1978, the proportion of academic doctorates had fallen to 8.5 percent of the total.

This shift in the balance between academic and professional graduate study can be examined in more detail by looking at trends for individual fields of study. (See Figures 8-19 in Appendix C.) At the doctorate level, several shifts are of particular importance. The most striking shift in doctorates awarded by field of study is the decline in the number of doctorates awarded to men in the physical sciences. In 1968-69, more than 4,600 men received doctorates in the physical sciences -- more than the number of men receiving doctorates in any of the other fields shown. By 1978-79, the number of men receiving doctorates in the physical sciences had fallen to about 3,400 -- a number smaller than the number receiving degrees in the social sciences, education, and the life sciences. (This fall in the number of physical science doctorates is mirrored by a similar, but somewhat less dramatic decline in the number of doctorates in engineering over the same period.)

At the Master's level, two trends stand out. First, the number of degrees granted in business administration has risen sharply, for both men and women. For men, the number rose from about 18,000 in 1968-69 to nearly 40,000 in 1978-79. For women, the number rose from several hundred in 1968-69 to more than 8,000 by 1978-79.

The second important shift in Master's degrees awarded occurred in education, particularly for women. From 1968-69 to 1976-77, the number of Master's degrees in education granted to women rose from about 38,000 to more than 80,000. It then fell by about 8,000 between 1976-77 and 1978-79.

For first-professional degrees, the largest increases for men and women took place in law. In the two years between 1970 and 1972, the number of law degrees awarded to men jumped from a little over 15,000 to about 25,000. For women, the number of law degrees granted has also increased dramatically, from about 500 in 1968-69 to nearly 10,000 in 1978-79. (For both men and women, the

number of degrees in medicine also increased somewhat over the decade, but the increases are not nearly as substantial.)

Finally, at the Bachelor's level, several trends stand out. First, for both men and women, the number of degrees granted in the physical sciences declined over the decade. Also, for both men and women, the life sciences and business made steady gains. For women, the number of degrees in education rose sharply in the early part of the decade, and then fell even more sharply in the second half. For men, the number of degrees awarded in the social sciences more or less followed the pattern observed for women in education.

The discussion so far has focused on degrees produced in different fields of study, but it would be equally important to examine other measures of shifts across fields -- for example, applications, number of students admitted each year, and number of students enrolled. Unfortunately, however, at the national level, data on graduate application and admissions are not regularly collected across disciplines (although some organizations collect data on these topics for specific fields). Some national data are available on enrollments by field of study, but they have not been collected or reported in as systematic a fashion as the data collected on degrees. (We will turn to this problem again in Sections V. and VI.)

Data on applications and admissions are available, however, for a selected set of academic departments in the COFHE graduate research project institutions. (For a list of the departments and institutions, see Appendix C, Table 11.) The institutions included in the COFHE are all major research universities, and the departments studied fall into four categories: the social sciences, science, engineering, and the humanities. Over the period under study (1972-1980), the average number of applications per department increased in engineering, declined in the social sciences and humanities, and stayed roughly constant in the sciences. The average number of admission offers, however, shifted somewhat less than

applications. The number of admissions offers stayed roughly constant in the sciences and social sciences, increased in engineering, and declined somewhat in the humanities. Similarly, the average number of new students enrolling per department stayed constant in the sciences and social sciences, increased in engineering, and declined in the humanities. (See Table 17, Appendix C.)

These trends at COFHE projects institutions are generally similar to the field of study trends observed nationally, but there are some differences, which once again call attention to the fact that different types of graduate institutions face somewhat different conditions and prospects. For example, although the number of degrees granted in the physical sciences has declined nationally over the past decade, enrollment in physical science has stayed about constant at COFHE institutions. And while the number of graduate degrees granted in engineering has fallen nationally, enrollment of new graduate engineering students at COFHE project institutions has increased.

IV. PATTERNS IN GRADUATE FINANCIAL SUPPORT

Breneman (1975, 1978) has documented changes in the financial support for selected science departments over the period 1967-1975. In the intervening time, two major empirical studies have taken place, which provide some systematic update to Breneman's principal findings: The Study of Talented and Needy Graduate and Professional Students conducted by Herb Elamer and Dwight Horch of the Educational Testing Service for FIPSE, and the Graduate Research Project of the Consortium on Financing Higher Education.

In this section, we will draw on these and other studies to describe some of the major trends in graduate student support over the past decade. In our discussion, two main points of view are incorporated: an individual student perspective and a collective institutional perspective. Together, these two points of view encompass and often highlight the competing goals of graduate financial support policies thoughtfully discussed in the companion paper by Anderson and Sanderson.

For purposes of discussion, it is useful to classify the various kinds of financial support available to graduate students in two ways: by <u>type</u> of support (fellowships, research assistantships, teaching assistantships, traineeships, and so forth); and by the <u>source</u> of the funds used (the federal government, the university itself, other sources, such as businesses and private foundations, and so forth). Using this scheme, it is possible to locate most of the major kinds of financial support in a grid.

SOURCES OF SUPPORT

MAJOR TYPES OF SUPPORT	Federal Government	State Government	University Sources	Student/ Family	Other Outside Sources
Fellowships	NSF Fellowships	State Fellowships/ Scholarship Programs	University Fellowships		Private Corporation Fellowships
Research Assistantships	Federal Research Grants College Work-Study		University Research Support		Private Foundation Research Grants
Teaching Assistantships		Direct State Appropriation to University Budgets	University Operating Budget		
Traineeships	NIH, ADAMH Training Grants				Private Corporation Traineeships
Other	Federal Guaranteed Student Loans National Direct Student Loans	State Guaranteed/ Administered Student Loans	University Loans	Personal Savings, Off-Campus jobs, Private Loans	Support from Employers

The most important types of support include:

1. Fellowships --
grants awarded directly to students usually on the basis of merit, based on some organized selection (competition) process. The awards typically include a tuition and a stipend (i.e. salary) partion. The term "scholarship" is sometimes used to refer to a grant that covers tuition but carries no stipend (though frequently these awards are also called fellowships).

2. Assistantships --
Two kinds of service (i.e. work-required) awards are called assistantships, research assistantships (RA) and teaching assistantships (TA). For both, students are officially "appointed" by the university, although in practice actual selection of students is usually a department's or individual faculty member's decision. Assistantships typically include a salary portion and some tuition remission. Students are usually restricted by academic degree requirements to some maximum number of hours they may work as TA's or RA's. TA's perform instruction-related duties (for example, they lecture, conduct classes, read and grade papers, and they are paid through the university's instructional budget. RA's assist faculty members on funded research projects and are paid from the grant or contract administered by the faculty member.

3. Traineeships --
combine some of the features of fellowships and assistantships in that they include a tuition and a salary portion. Generally, traineeships require some prescribed course of study, are federally funded and are available only in certain fields of perceived importance, such as the social, behavioral and biological sciences.

4. Other --
Two additional major types of support are available to graduate students: Work-Study and Loans. Work-Study is a federal program whereby graduate students eligible on the basis of financial need are partially supported (some tuition and some salary) while working under the supervision of a faculty member on projects of direct educational interest. Student loans usually refers to the federally guaranteed student loan programs [National Direct Student Loans (NDSL) and Guaranteed Student Loans (GSL)]. Of course, other formal methods of support exist, such as university loans, private bank loans, veterans' (G.I. bill) or Social Security benefits, and support from employers. There are also less formal methods, such as personal loans from family and support from a working spouse or partner. These latter types of support, however, fall outside the scope of this paper.

One of the most striking features of graduate student financial support, when compared with undergraduate financial aid, is how loosely-coupled the elements of an individual graduate student's support "package" can be. During the course of doctoral studies, a student may, and many frequently do, receive several different types of support as is well documented in the Surveys of Earned Doctorates.

The particular types of support available to graduate students differ by academic area. For example, in certain science disciplines, where NSF, NIH and several private fellowship programs exist, where sponsored research support is concentrated, and where teaching and laboratory assistants are often required for undergraduate courses heavily subscribed by pre-medical students, the full range of types of support might be available. In the humanities on the other hand, some variety in types of support exists but that variety includes far fewer nationally known fellowships and research assistantships.

The stipend rate - the salary a graduate student earns while holding a fellowship - varies considerably from one institution and academic department to the next, although there is considerable uniformity among the major research

universities. It is not uncommon for a student in the humanities to earn only half the stipend a student in one of the sciences or engineering might earn. Financial support in first-professional degree programs, such as law, business or medicine, is different again. Virtually all support for professional students is in the form of loans. Students in law and medicine, for example, rarely serve as teaching assistants or research assistants because, among other things, the highly structured nature of their program of study usually does not allow the time. Doctoral students in a field like physics, on the other hand, are almost certain to serve both as teaching assistants and as research assistants because the discipline considers teaching and research experience an integral part of the academic training. Master's degree students, because they generally spend less time in graduate school, may be unable to gain enough experience to serve as either teaching or research assistants. At major research universities the majority of available support is channeled to doctoral students. The vast majority of departments either preclude master's students from fellowship or assistantship support or only award such support under exceptional circumstances to especially qualified master's students.

Again, this differs by discipline. In engineering, for example, where more and more highly qualified students choose high paying jobs in industry rather than the relative poverty of graduate school, many departments can only attract a handful of students into doctoral degree study -- the vast majority applying for M.S. (Masters of Science) or MSE (Masters of Science in engineering or E (professional Engineer) degree. In an effort to try to keep those students with the most promise in school, some of the "best" available support i.e. fellowships (paying the most money and denoting greater "merit") are now awarded to Master's students.

We now turn to a discussion of the emerging patterns in the types and sources of graduate financial support. Based on our review of the data we have collected, we offer the following five observations to summarize our findings:

1. The amounts and types of fellowship support available to graduate students have declined over the last decade.

2. The basic system of allocating support on the basis of "merit" continues to dominate the distribution of funds administered by graduate institutions and departments. Due to cuts in federal and private sources of fellowship support, however, a dual system of support now exists, wherein students borrow the difference between any "merit" support they receive and the total direct cost of attending graduate school.

3. There is a growing trend on the part of the major financial support sources (external to the universities) to reduce the average amount of awards granted, in effect covering less of a student's total costs.

4. The use of federal College Work Study (CWS) has partially compensated for the decline in other forms of federal support of graduate students.

5. Federally guaranteed student loans have become an integral part of the support of graduate education.

Fellowships, Traineeships and Assistantships

The segmentation of doctorate-granting institutions is quite evident in data compiled by the National Science Foundation (NSF). In 1980, for example, the twenty COFHE Graduate Project Institutions which constitute only six percent of all doctorate-granting institutions (20 of 328 institutions by NSF count), accounted for 17 percent of all full-time graduate science students enrolled in doctorate-granting institutions (38,996 of 230,601 students). (See Table 11 in Appendix C for a list of COFHE institutions.) More importantly, the twenty institutions enrolled more than one-fourth of all the full-time science students primarily supported by federal fellowships and traineeships (4,909 of 18,451 students). In addition this small set of institutions supported 35 percent of all the full-time science graduate students primarily supported by institutional fellowships (4,458 of 12,787 students).

Table 18 in Appendix C summarizes the number of full-time science graduate students by type and source of major support. From 1976 to 1980, the number of full-time science graduate students enrolled at doctorate-granting institutions increased by seven percent from 215,355 to 230,601. Throughout the period (1976-1980), each year approximately 23 percent of all full-time science students were supported primarily by federal funds, while another 37 percent yearly were supported primarily by institutional funds.

A first impression based on the figures in Table 18 is that the late 1970's was a period of stability in the aggregate support for the sciences. In one respect, that is true. Breneman observed that by 1975 "...the forms of graduate student support dominated by the federal government -- fellowships, traineeships and research assistantships -- [had] become increasingly concentrated in the highest rated departments even as the number of such awards [had] declined." Using the COFHE group as a rough proxy for "highest rated departments" we infer that the concentration of federal support in the sciences continues to be focused on the highest rated departments.

However, in another important respect, we know that the entire decade of the 1970's has been anything but stable for the sciences. The number of NSF fellowships and traineeships (new awards) which totaled 1,941 in 1970-71 was down to 500 by 1980-81. In fact, the <u>total</u> number of NSF fellowships (new and continuing awards) in 1980-81 was only 1,530 -- about three-fourths the number of <u>new starts</u> 10 years previously. In 1971 total NSF outlays for graduate student support were $34 million; in 1980, funding was only $11.8 million.

Not only has the number of NSF fellowships dramatically decreased as graduate doctoral enrollments have remained relatively stable (in those institutions training the largest number of the nation's scientists), but a shift in policy has taken place whereby the few NSF fellowships remaining no longer cover a graduate student's portion of direct costs. Institutions have tried to make up

the difference between what NSF used to cover and the total students' direct costs, placing an additional burden on the already strained finances of graduate institutions.

Nor have the humanities and the social sciences faired any better during the 1970's. As Anderson and Sanderson point out, only a small number of private foundations remain as major sources of graduate student support -- Danforth, Ford and Woodrow Wilson fellowship programs have been discontinued recently. And, the major federal fellowship programs (excluding NSF) that remain support about 4,000 new and continuing students (4,050 in 1980-81 -- from Table 19). Federal outlays for graduate student support, which peaked in FY'73 at about $1.3 billion, decreased to just over $800 million in FY'77.

Loans

At major doctorate-granting institutions, there is an observable increase on the part of graduate students in the use of loans to finance their graduate studies. Hooper and Kurshler, for example, in a recent survey of selected graduate institutions conducted in conjunction with COFHE, found that, while the federal fellowship portion of graduate student support as a percent of required finances is decreasing, the proportion of graduate student support attributable to loans is increasing. (See Appendix D , "Documentation for the Survey of Types, Sources, and Dissemination of Support for Graduate Education," for a more complete discussion of these findings.)

A recent COFHE survey of doctoral admits in arts and sciences and engineering found that more than half of those responding expect to carry educational debt by the end of their graduate studies. As might be expected, estimated educational loan debt varies considerably from one individual to another depending on circumstances and varies even more by area of study (as do actual amounts

and types of support available). What is surprising is that about half of the admitted doctoral students in all the areas surveyed expect to incur graduate debt, even in science and engineering programs where relatively speaking, more graduate support is available than in the humanities.

The change in graduate student expectations and in actual practice is corroborated by the FIPSE Study results as well as several institutional self-studies, by Princeton and Stanford to name but two.

A recent survey of graduate students at Princeton found the averages of current educational loan debts for those who have borrowed ranging from $4,600 to $7,000. At Stanford University, based on a recently completed survey, more than half of all survey respondents expect to complete their graduate studies carrying total educational debt (undergraduate plus graduate) averaging $9,500. About 60 percent of the doctoral students responding either currently have or expect to incur educational debts; about 70 percent of the Master's level respondents expect educational debt by the time they complete their present degree studies.

The reported cumulative graduate loans incurred by current students averaged $5,500 for doctoral students (an average of 3.3 years into their doctoral studies), $7,250 for MA students and $5,600 for MS students. The figures are consistent with the FIPSE results and with our understanding of current available support at these institutions.

The magnitude of these figures suggests that generally graduate students are frugal borrowers. Doctoral students are accumulating debt at a more modest rate per year than Master's students but have several more years of studies to finance. Master's students, on the other hand, appear to borrow more, probably due to the fact that considerably less support is available to them. The strong impression, which well have to be investigated in subsequent studies, is that educational debt financing has become an integral part of graduate studies across

the whole range of graduate degree programs in arts and sciences, humanities and engineering.

Central to any discussion of recent and emerging trends in graduate student support is information about graduate student participation in the federal guaranteed student loan programs, National Direct Student Loans (NDSL) and Guaranteed Student Loans. Also important is graduate student participation in the College Work-Study Program.

To our knowledge no systematic attempt has been made to determine in agregate the full extent of graduate student borrowing (separate from undergraduate borrowing) over time. Presented in the table below are estimated graduate student participation rates and associated federal outlays for each of three programs. Using data from three sources: NCES, the American Council on Education and the U.S. Department of Education's Office of Student Financial Assistance, the results of our calculations support the view that graduate students are relying increasingly on loans to finance their studies.

In FY'81 more than one-half million graduate students borrowed an estimated $1.02 billion dollars through GSL; 66,300 graduate students borrowed $15.8 million through NDSL; and 49,000 were partially supported by Work-Study funds totaling $27.5 million.

Graduate Student Participation in USOE Loan and College Work-Study Programs, 1963-1981

Fiscal Year	National Direct Student Loans(a,b)		Guaranteed Student Loans(a)			College Work-Study Programs(a,b)	
	No. Students Thousands	Federal Capital Component, $ Million	No. Approvals, Thousands	Amount Borrowed $ Million	Federal Interest Payments, $Million	No. Students Thousands	Amount, $Million
1963	13.0	5.4					
1964	14.8	6.5					
1965	19.2	7.8					
1966	22.7	10.8	4.4	7.0	0.0	11.0	2.2
1967	23.7	10.6	29.7	22.4	1.0	12.0	5.4
1968	25.7	10.7	46.4	39.2	2.8	14.1	5.4
1969	27.4	11.0	70.9	61.8	4.4	15.4	5.7
1970	27.1	11.3	82.9	75.6	9.3	17.0	5.9
1971	33.7	13.6	97.3	94.0	13.3	24.0	9.5
1972	36.9	17.2	113.1	117.1	17.8	NA	10.9
1973	37.3	16.3	96.8	101.0	19.1	22.2	10.8
1974	41.4	17.4	114.4	175.4	34.2	22.2	10.5
1975	48.3	22.4	148.6	194.7	31.4	25.6	18.9
1976	59.6	25.0	189.5	266.8	36.9	40.4	22.6
1977	63.6	25.6	145.9	230.5	33.7	46.4	27.3
1978	65.4	24.9	162.7	293.8	37.2	41.2	22.7
1979	78.1	25.3	241.6	477.4	47.3	46.1	27.3
1980	73.0	23.3	393.3	822.8	65.6	48.7	27.3
1981	66.3	15.8	560.0	1020.0	109.3	49.0	27.5

Data for 1963-1972 taken from: National Board on Graduate Education. Federal Policy Alternatives Toward Graduate Education. Table A.8

Data for 1972-1981 based on (A) extrapolation from Table A.8 Federal Policy ...
(B) Atelsek, Frank J. Estimated Number of Student Aid Recipients, 1976-77. American Council on Education, 19
(C) Estimate of percentage graduate participation from "Denying Loans to Graduate Students", Robert L. Jacobson. Chronicle of Higher Education XXII, Feb 17,

Fractions (A) (B) (C) were applied to total participants and amounts spent as presente in U.S. Department of Education, OSFA Program Book, July 1981

Fractions used are as follow:

	NDSL	GSL	CWS
(A)1973	.057	.094	.04
(B)1974	.061	.154	.039
1975	.07	.15	.045
(B)1976	.078	.146	.058
1977	.08	.15	.055
1978	.081	.15	.05
1979	.082	.16	.05
1980	.083	.17	.05
(C)1981	.085	.2	.05

V. SOURCES AND QUALITY OF THE DATA

A large number of organizations collect regular data pertaining to graduate and professional education in the United States. As one might expect, the data collected differ in a number of important ways. Some data bases cover the universe of graduate and professional education. Others cover certain kinds of graduate education (for example, graduate education in the sciences, education at major research universities, or education at the doctoral level.)

In assessing the present state of graduate and professional education, and, in particular, in identifying recent trends in graduate student support, it was necessary to draw on a number of these sources of information since no single source of information covers both the breadth of graduate education or the depth of detail required. Also, each source has particular strengths and limitations.

In this Section, we summarize some of the key sources of information on graduate education and give a brief indication of the ways in which these sources fit together. Then, in Section VI, we will make a number of recommendations concerning analyses and data collection activities that might improve the coordinated use of various data bases to describe graduate and professional education.

National Center for Educational Statistics (NCES)

The largest regular source of data on graduate and professional education is collected by NCES, as part of the Higher Education General Information Survey (HEGIS), which is completed annually by all two-year and four-year colleges, and universities, and professional schools in the United States. The HEGIS survey requests two types of information particularly relevant to graduate and professional education: information on the number of students

enrolled for advanced degrees; and information on the number of advanced degrees granted each year.

Information on both enrollment and degrees conferred is available in roughly consistent form beginning in about 1948 (although frequent changes in format and questions asked make precise comparisons over time difficult). Enrollment data at the graduate level is collected for Master's and doctoral programs combined, rather than separately for the two degrees. In general, enrollment data are available for full and part-time graduate students, and for first-year and beyond first-year students, by field of study and gender. (Until 1976, enrollment was collected by individual academic discipline. Since 1976, it is available only for broad areas of study.) Starting in Fall, 1976, data are also available on enrollment by ethnicity. Data on the number of degrees conferred are available for Master's and doctoral degrees separately, by academic discipline and gender, and (starting in 1975-76) by ethnicity.

Data on enrollment and earned degrees conferred are reported in detail in two annual NCES publications: Earned Degrees Conferred, and Fall Enrollment in Higher Education. In addition, the data are usually summarized in The Digest of Educational Statistics and in Projections of Education Statistics.

NCES also collects extensive information on institutional revenues and expenditures as part of the HEGIS survey, reported annually in Financial Statistics of Institutions of Higher Education. Our recent experience has been that this information is more useful in providing a general indication of the financial condition of colleges and universities than it is in providing information that speaks directly to the financial condition of graduate education. While it is difficult, if not impossible, to disentangle financial information for graduate education from overall institutional budgets,

it might be possible for HEGIS to collect certain financial information especially relevant to graduate education -- for example, expenditures for teaching and research assistantships and graduate fellowships.

National Research Council

The National Research Council maintains an extensive data base on doctoral recipients in the United States. Since the late 1950's, the NRC has conducted an annual Survey of Earned Doctorates, which is filled out by each doctoral recipient at the time of graduation. The Survey of Earned Doctorates requests information on field of study, sources of support, ethnicity, gender, and postdoctoral plans. (In addition, using archival information from American universities, the NRC has constructed a Doctorate Records File, containing information on doctorates granted since 1920.)

Information from the Survey of Earned Doctorates is published annually by the NRC in Summary Report: Doctorate Recipients from United States Universities. In addition, the NRC has completed an extensive analysis of trends in doctorate production in the United States, reported in A Century of Doctorates.

Both the NRC and NCES surveys are intended to cover the universe of doctorate recipients in the United States. In recent years, both surveys have asked comparable questions concerning academic discipline, gender, and ethnicity. We are not aware of any systematic comparison of the two sources of data on doctorates. Our preliminary comparisons suggest that, while they generally agree in the magnitude of aggregate numbers, they tend to disagree somewhat in the details. When these two sources disagree, NRC data tend to show slightly lower counts. In addition, there are some discrepancies in degrees granted by ethnicity.

National Science Foundation (NSF)

Since 1967, the National Science Foundation has collected data on graduate science enrollment in the United States annually. For the period 1967-71, the information was collected as part of the NSF Graduate Tranineeship Program. In 1972, a full-scale annual survey was instituted, including all institutions known to grant at least one doctorate in a science or engineering discipline. (The 1972 survey included about 4,500 academic departments in 260 universities). In 1973, the sample was enlarged to include biomedical and clinical medical departments. This added about 1,000 departments to the sample. The survey was expanded again in 1976, to include institutions granting Master's degrees. By 1978, the NSF surveys included roughly 9,500 academic departments in more than 1,000 institutions.

The annual survey is aimed at the department level and includes questions about full- and part-time enrollment and major sources of graduate student support. Recently, the data have been collected by gender and ethnicity. Summaries are published by NSF, in Academic Science: Graduate Enrollment and Support.

We are not aware of a systematic comparison of NCES and NSF enrollment data for science departments. Since both are collected by disciplines, it should be possible to conduct such a study. Unfortunately, for purposes of describing trends in graduate support in the sciences, the NSF survey has a major weakness. The fact that the number of academic science departments included in the NSF survey has increased dramatically over the 1970's makes it difficult to draw inferences directly from published reports about changes over time in the types and sources of graduate student support. (We return to this typic in more detail in section VI, below.)

Council on Graduate Schools

Since 1971, the Council of Graduate Schools (CGS), in conjunction with the Graduate Record Examination Board, conducts an annual survey of graduate student enrollment at universities which are members of the Council. The survey includes questions concerning number of applications for graduate study, full- and part-time enrollment, and the number of graduate students with financial support, by academic discipline and gender. In addition the survey asks for enrollment data separately for new entering graduate students and continuing graduate students.

One positive feature of the CGS survey is that it potentially includes almost all doctorate-granting institutions (in 1981, CGS surveyed 365 graduate institutions) and a large portion of the Master's degrees granted each year nationally. The Council encompasses graduate institutions that enroll more than 60 percent of the total graduate enrollment, perhaps as many as 80 percent of the Master's degrees granted yearly, and more than 95 percent of the doctorates granted early.

One negative feature of the Survey is that the response rate on some items is low, and the results of the Fall Enrollment Survey are usually reported only for those institutions responding. No attempt has been made to derive estimates, using sampling techniques, for the total population of doctoral institutions. In addition, since the institutions responding tend to differ from year to year, it is difficult to describe trends over time or to associate Survey results with national counts from NCES.

Given the number and variety of graduate institutions in the CGS Survey, it should be possible to group the data from responding institutions, so that graduate admission and enrollments can be described over time for subsets of institutions. CGS data were recently employed in this fashion for COFHE

Graduate Research Project institutions, as reported in Section III of this paper.

National Longitudinal Study of the High School Class of 1972

In 1972, NCES began a large-scale longitudinal study of the high school class of 1972. A national sample of about 20,000 high school seniors were surveyed in the spring of 1972. The same students were surveyed again in the fall of 1973, the fall of 1974, the fall of 1976, and the fall of 1979. Those students who went directly from high school to college, graduated in four years, and went directly to graduate school would have entered graduate school in the fall of 1976 (at the time of the third NLS follow-up survey). Many other students who took longer to complete college or delayed entering graduate school may have initiated graduate studies by 1979 (the time of the fourth NLS follow-up).

The NLS asked questions about financial aid, as well as questions about the reasons for selecting different kinds of educational programs. We think it offers an excellent source of data on student paths through college, graduate education and work. As far as we know, NLS data concerning graduate and professional school participation have not been thoroughly analyzed.

The Consortium on Financing Higher Education (COFHE)

The COFHE Graduate Research Project is currently engaged in several research studies on the financing of graduate education. An extensive data base has been compiled using data on the 198-82 graduate applicants (Master's and doctoral) in nine departments. The data on over 18,000 applicants includes admission and financial support; information provided by each of the twenty participating institutions, as well as survey information obtained directly from 725 admitted doctoral applicants. The study will permit a careful

analysis of financial support offers and student choice of graduate and professional school and systematic estimation of the size of graduate applicant pool. A second data collection for 1982-83 graduate applicants is in progress.

Results of the recently completed COFHE study of graduate admission trends in 23 departments, 1970-1980, are available and are referenced in Section III of this paper. Similar trend analyses are being considered using application, admit and enrollment data already collected on the graduate departments. In addition, COFHE is currently conducting a study of 1982 college graduates for 28 institutions. The Senior Survey Study focuses on students' post-graduation plans. The results of the study will be available in October, 1982.

Finally, Rose Hooper (University of Michigan) is replicating the survey of sources and dissemination of graduate support first conducted for COFHE in 1979-80 and discussed in detail in section IV and in the paper by Anderson and Sanderson. This should provide three consecutive years of aggregate data for COFHE graduate project institutions.

VI: RECOMMENDATIONS

Although the main purpose of this paper is to describe the nature and scope of graduate education rather than to critique the current state of available data, we believe it is appropriate to suggest to the Commission some actions which we think would improve our ability to understand the terrain of graduate education.

In our effort to summarize recent and emerging trends, we have encountered some limitations in the information available at present. Some of the limitations can be overcome only by collecting new data or by modifying existing surveys. But, much can be learned by further analysis of existing information. It is the latter kind of recommendations to which we turn first:

1. We urge the analysis of data from the National Longitudinal Study of the High School Class of 1972 (NLS) to determine who goes to graduate school and why.

   Discussion: Too little is known about the paths students take from undergraduate to graduate school and beyond. We know that some students attend graduate or professional school immediately after college, while others delay post-baccalaureate studies. We also know that some attend full-time while others, in increasing numbers, attend part-time. But we know little about the reasons for their choices, about the role financial support considerations may play or about the participation rates of people in different circumstances and with different educational and employment experiences. The analysis we recommend would yield useful information about the immediate and eventual graduate school participation rates of one cohort of students. The results would be easily and quickly obtainable, and would serve as a benchmark against which present participation rates could be compared.

2. We urge the analysis of data from the National Science Foundation (NSF) and National Institutes of Health (NIH) joint Survey of Graduate Science Student Support and Postdoctorals (GSSSP) to identify changes in enrollments and financial support over time for a consistent set of departments and institutions.

   Discussion: Breneman (1973 and 1978) conducted an analysis of this sort using NSF data on selected science departments in graduate institutions for the period 1967-75. A similar analysis using the same set of institutions for the period

1976-81 could clearly identify changes in graduate student support for those disciplines previously analyzed. An expanded set of departments including those not covered in the earlier time period should also be analyzed so that some comparison can be made between present support in the social and physical sciences.

3. We urge the analysis of data from the Council of Graduate Schools (CGS) Fall Enrollment Surveys to derive counts of graduate school applications, first year enrollment, total graduate enrollment and the proportion of graduate students support.

   Discussion: Responses from the CGS Fall Enrollment Survey have been summarized each year since the surveys were first conducted in 1971. However, due to inconsistency in the institutions responding from one year to the next, it is difficult to make direct inferences about trends.

   As in the analysis proposed above using NLS data, we suggest that trends be described for a consistent set of institutions responding over time. Since the Council encompasses a wide variety of graduate institutions, it should be possible to select several groups (samples) of institutions representative of different types of graduate institutions. Some possible groupings come to mind: by control (public or private), by Carnegie classification (research universities, comprehensive colleges, etc.) -- which incorporates federal research support as well as degrees awarded, or by market (such as in the schema suggested by Anderson and Sanderson in their paper for the Commission). The same approach was employed for COFHE Graduate Research Project Institutions and yielded the application and enrollment figures presented in Section II of this paper.

4. We urge a review of major data collection procedures and instruments, such as the Survey of Earned Doctorates, the Higher Education General Information Survey (HEGIS) and others pertaining, in part, to graduate education, in order to develop greater consistency in data collected and reported about graduate education and to insure that what is collected is sufficient for planning and policy considerations.

   Discussion: Two examples come to mind to illustrate the need for such a collective review.

   First, national enrollment data at the graduate level is not currently available by specific field of study and degree level (Master's and doctorate). Until 1976, NCES collected fall enrollment data by individual disciplines, but, since then, the data is available only for broad

areas of study. In addition, enrollment information for these broad areas of study combine students in Master's and doctoral programs.

Second, although the HEGIS survey collects data on institutional revenues and expenditures, there is no reporting of information on revenues and expenditures particularly oriented to graduate education.

We believe that, where possible, such "holes" in data should be eliminated and we think major omissions as well as unnecessary duplication might be corrected by an ad hoc simultaneous review of several related surveys at this time.

5. We agree with the recommendation recently made to the National Endowment for the Humanities (NEH) by one of the authors of our companion paper that information about graduate school indebtedness and participation in federally guaranteed student loan programs be routinely collected. We urge the Commission to make a similar recommendation to the National Research Council (NRC) about the Survey of Earned Doctorates.

6. With regard to the issue of international students in graduate study, we urge the Commission to study this important and sensitive subject.

   Discussion: In light of the increasing numbers of international students enrolling in institutions of higher education in the United States, for planning purposes we need to know systematically where they come from, what disciplines they enter, how they are supported and the degrees they are awarded. Furthermore, we need to determine how effective international students are as teaching assistants in their academic disciplines. In addition, we need to know whether these students remain in the U.S. or return to their home country. Of those who stay, how do they contribute to the skilled personnel needed in our highly industrialized society. Of those who return to their home country, what social and economic contributions do they make to their society. Who benefits from this kind of exchange between nations?

7. We urge the Commission to initiate a comprehensive study of placement.

   Discussion: Academic job placement recently received some thought-provoking discussion by Bowen, among others. We think the growing debate over the employment prospects of graduates stems not so much from a

fundamental difference of opinion about whether there are too many (or too few) Ph.D.'s to meet the future need for faculties in academe as from a growing concern, on the part of many people, that the youth of our country might not develop their full potential because they are discouraged by the prospect of becoming "over-educated" i.e., under-employed. The issue of job placement, in its broadest sense, seems to us to be central to the Commissions mandate to "examine the extent to which students may be dissuaded from pursuing graduate education on financial (read economic) grounds."

APPENDIX A

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APPENDIX B. A LIST OF SELECTED FEDERAL LEGISLATION* PERTAINING TO GRADUATE EDUCATION

1937 National Cancer Institute Act- established Public Health Service Fellowship program. Fellowships through other agencies were authorized in subsequent legislation.

1954 Cooperative Research Act (P.L. 83-531) - authorized cooperative arrangements with universities, colleges, and state education agencies for educational resear

1958 National Defense Education Act (P.L. 85-865) - higher education student loans and fellowships; foreign language institutes and advanced foreign language study and training provided by colleges and universities.

1963 Health Professions Educational Assistance Act (P.L. 88-129) - provided funds to expand teaching facilities and for loans to students in the health profession

1963 Higher Education Facilities Act of 1963 (P.L. 88-204) - authorized grants and loans for undergraduate and graduate facilities in higher education institutions

1964 Economic Opportunity Act of 1964 (P.L. 88-452) - authorized grants for college work-study programs for students from low-income families (subsequently amended to include middle-income students).

1965 Health Professions Educational Assistance Amendments (P.L. 89-290) - authorized scholarships to aid needy students in the health professions; grants to improve the quality of teaching.

1965 Higher Education Act of 1965 (P.L. 89-329) - authorized insured student loans and provided for graduate teacher training fellowships.

1965 Medical Library Assistance Act (P.L. 89-291) - provided assistance for construction and improvement of health sciences libraries.

1965 National Foundation on the Arts and the Humanities Act (P.L. 89-209) - authorized grants and loans for research, training and scholarly publications in the humanities.

1966 International Education Act (P.L. 89-689) - provided grants to institutions of higher education for the establishment, strengthening, and operation of centers for research and training in international studies and the international aspects of other fields of study.

1967 Education Professions Development Act (P.L. 90-35) - amended Higher Education Act of 1965 for the purpose of improving the quality of teaching; to help meet critical shortages of adequately trained educational personnel.

1968 Higher Education Amendments of 1968 (P.L. 90-575) - authorized new programs to assist disadvantaged college students, and programs to assist colleges to combine resources for cooperative uses. Also authorized grants to expand and strengthen student cooperative programs and to expand programs which provide clinical experiences to law students.

1972 Education Amendments of 1972 (P.L. 92-318) - provided general aid for institutions of higher education; authorized the establishment of a Commission on Financing Postsecondary Education. Prohibited sex bias in admission to vocational, professional, and graduate schools.

1976 Education Amendments of 1976 (P.L. 94-482) - extended and revised federal programs for educational assistence for higher education. Provided for payments to institutions of higher education for administration expenses for federal student assistance; establishment of higher education centers and services for education information to assist students and teachers.

1978 Middle Income Student Assistance Act (P.L. 95-566) - modified the provisions for student financial programs to allow middle income students attending postsecondary institutions to qualify for federal education assistance.

1979 Department of Education Organization Act(P.L. 96-88) - established a Department of Education.

1980 Amendments to the Higher Education Act of 1965 (P.L. 96-374) - provided for a new "Commission on National Development in Postsecondary Education" and a new "Urban Grant University Program."

* Only those <u>parts</u> of the various laws which pertained to higher education are described here. This is not intended as a full description of each law.

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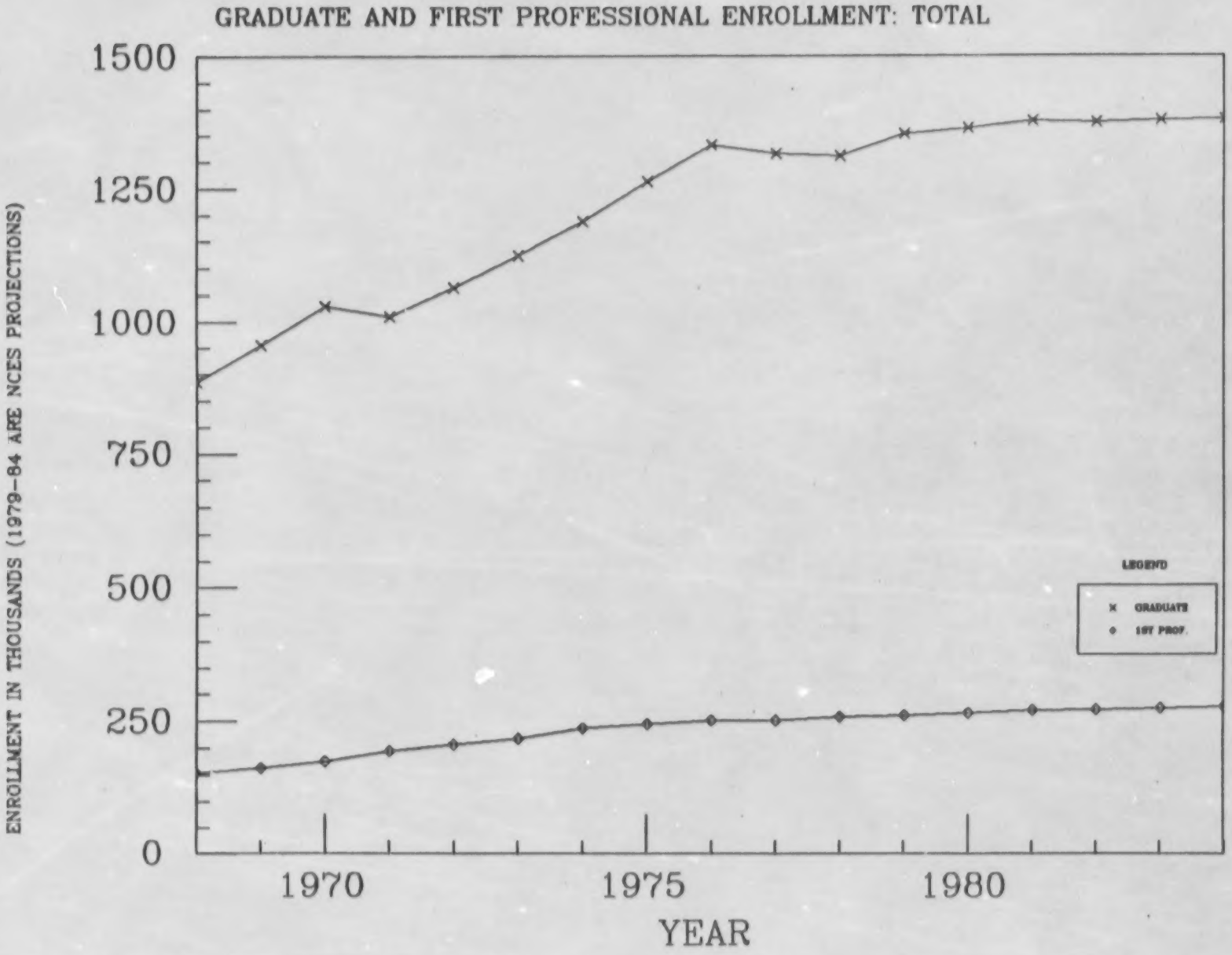

Figure 1

Source: Projections of Education Statistics

GRADUATE ENROLLMENT: MALE & FEMALE

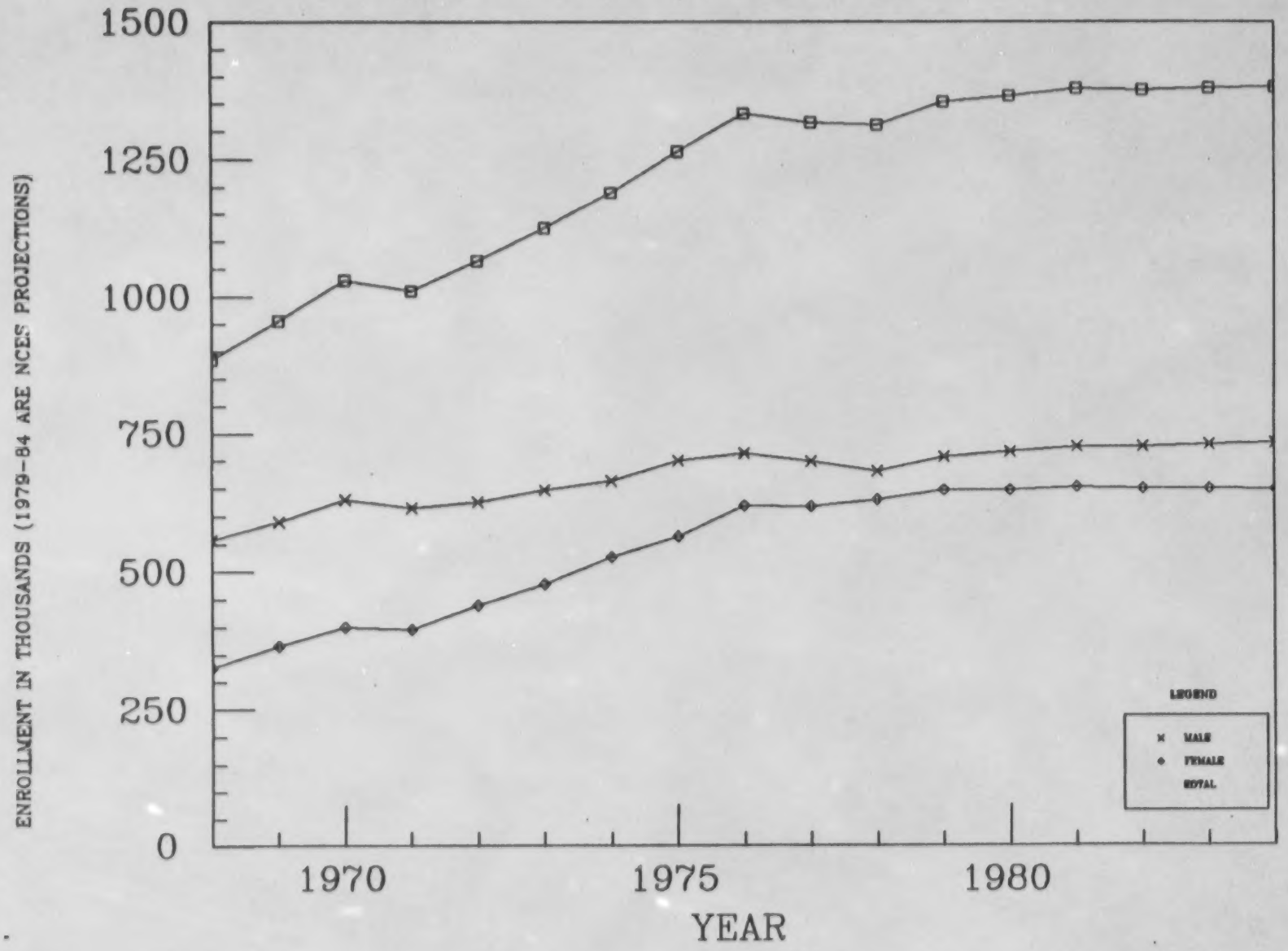

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Figure 2

Source: Projections of Education Statistics

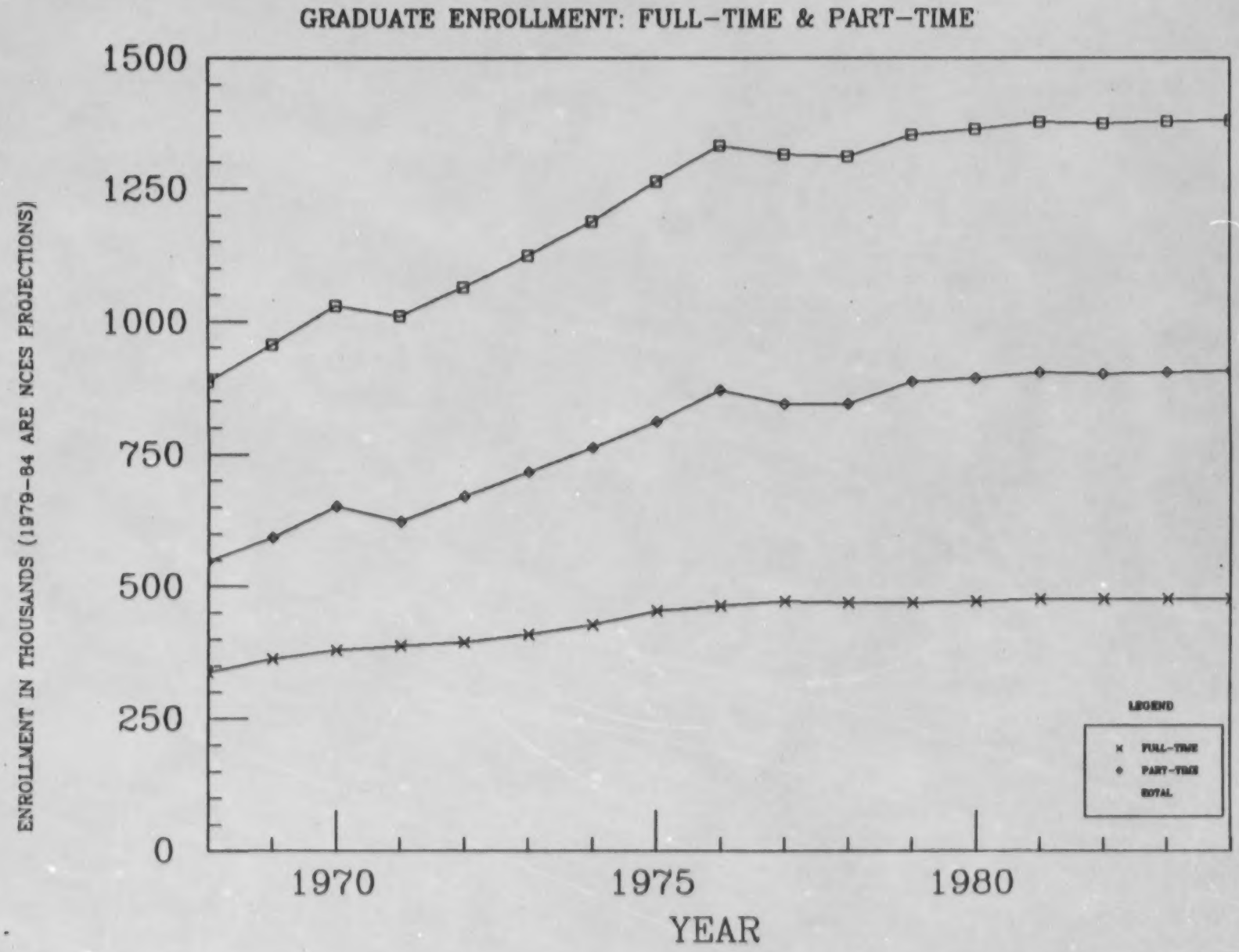

Figure 3

Source: Projections of Education Statistics

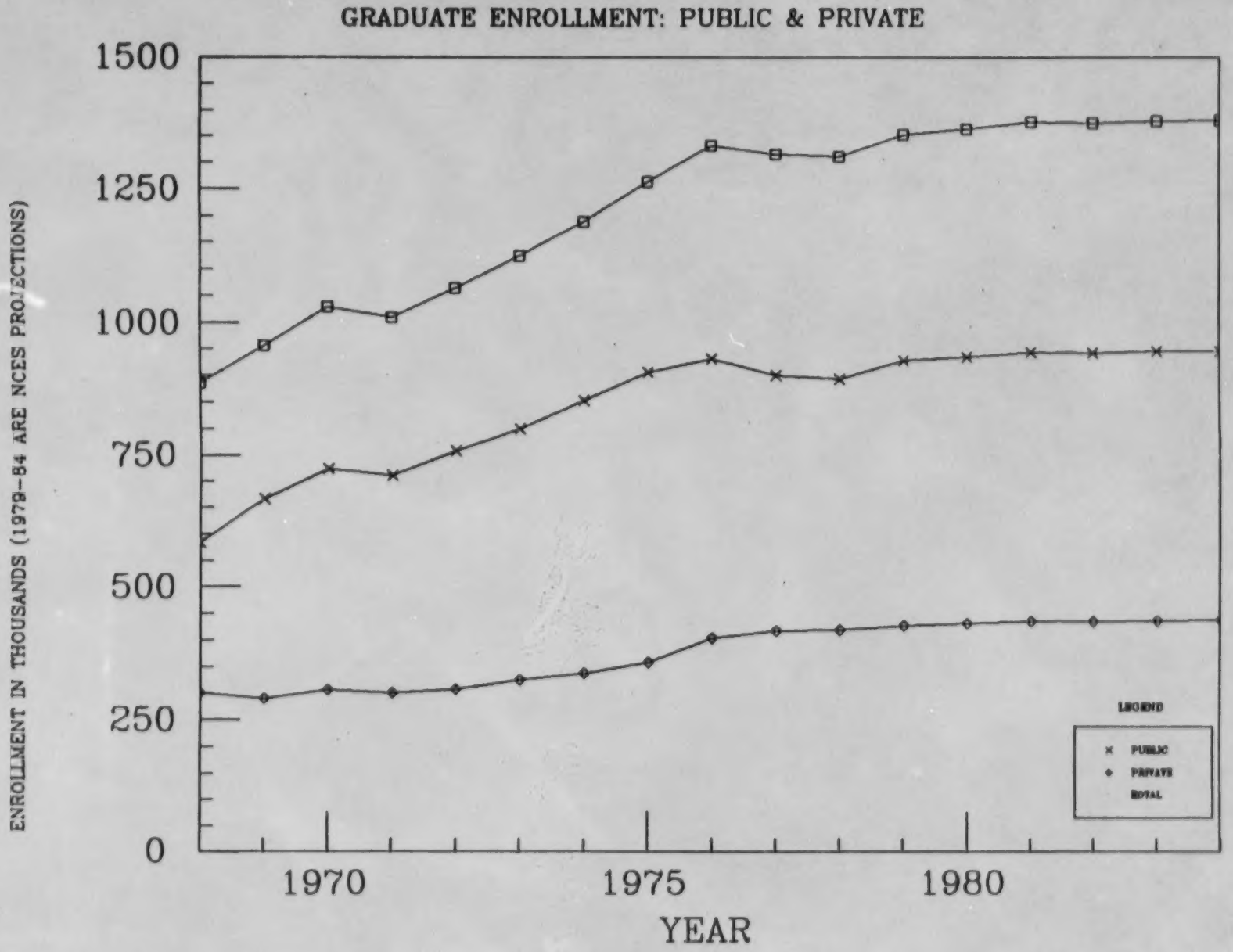

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Figure 4

Source: Projections of Education Statistics

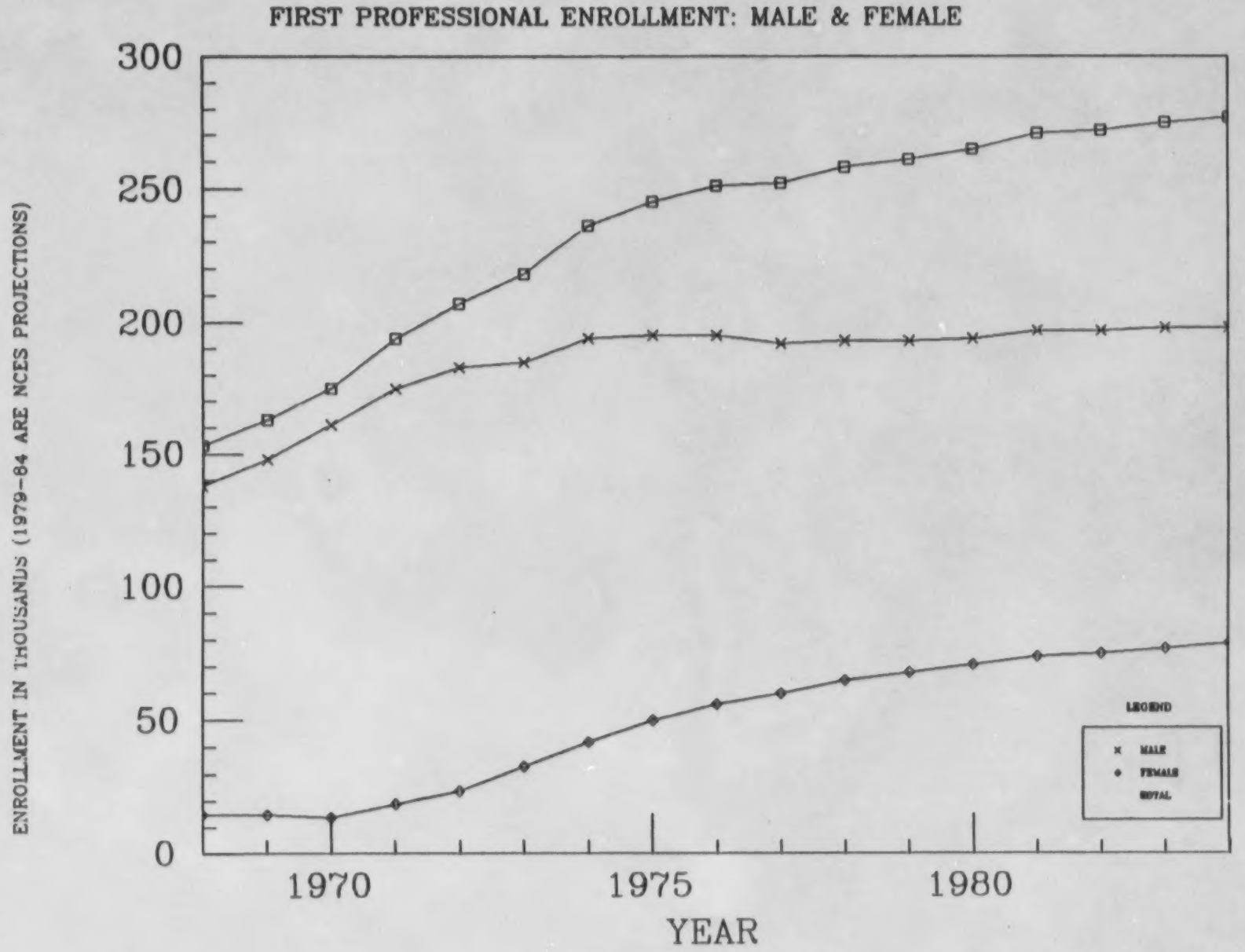

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Figure 5

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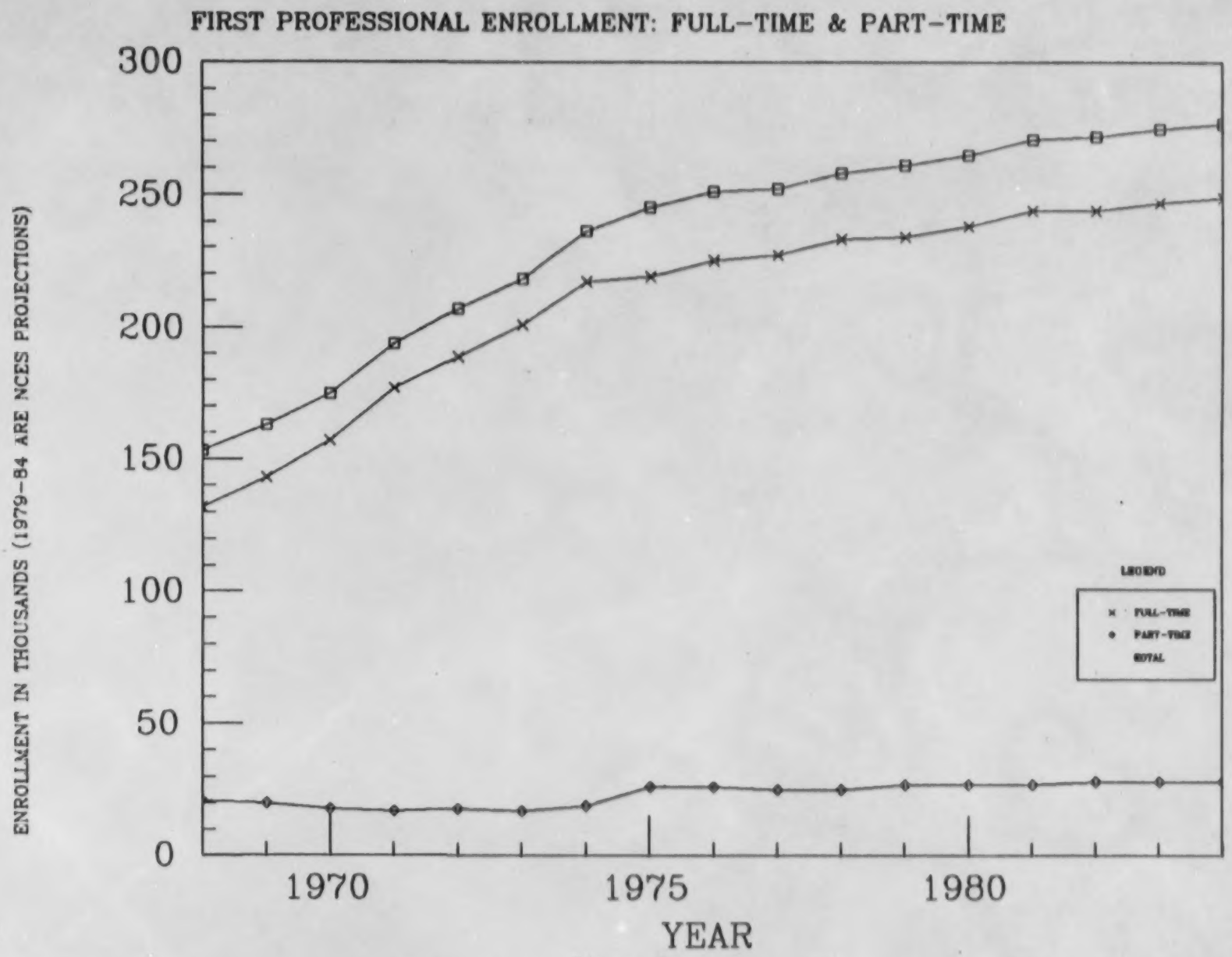

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Source: Projections of Education Statistics

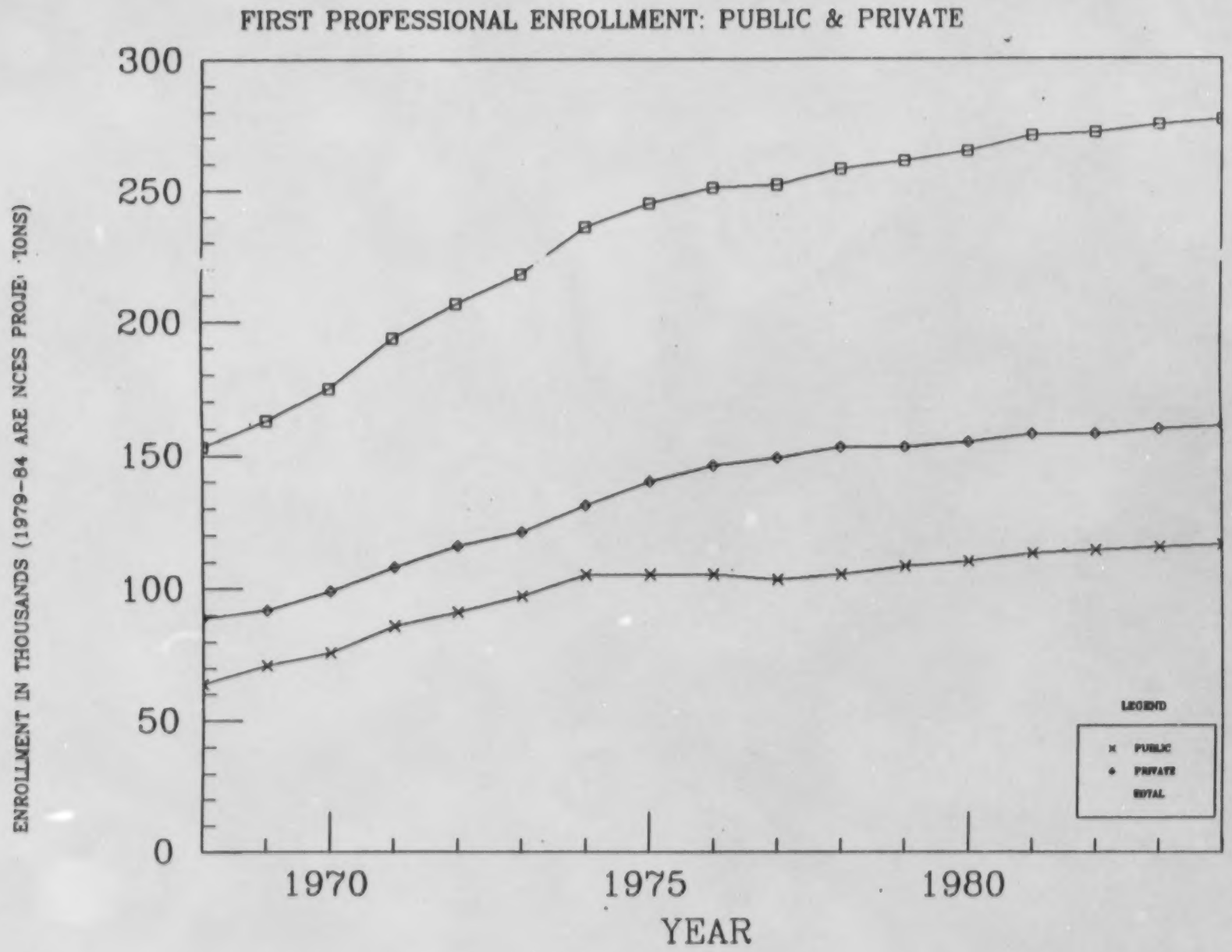

Figure 7

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

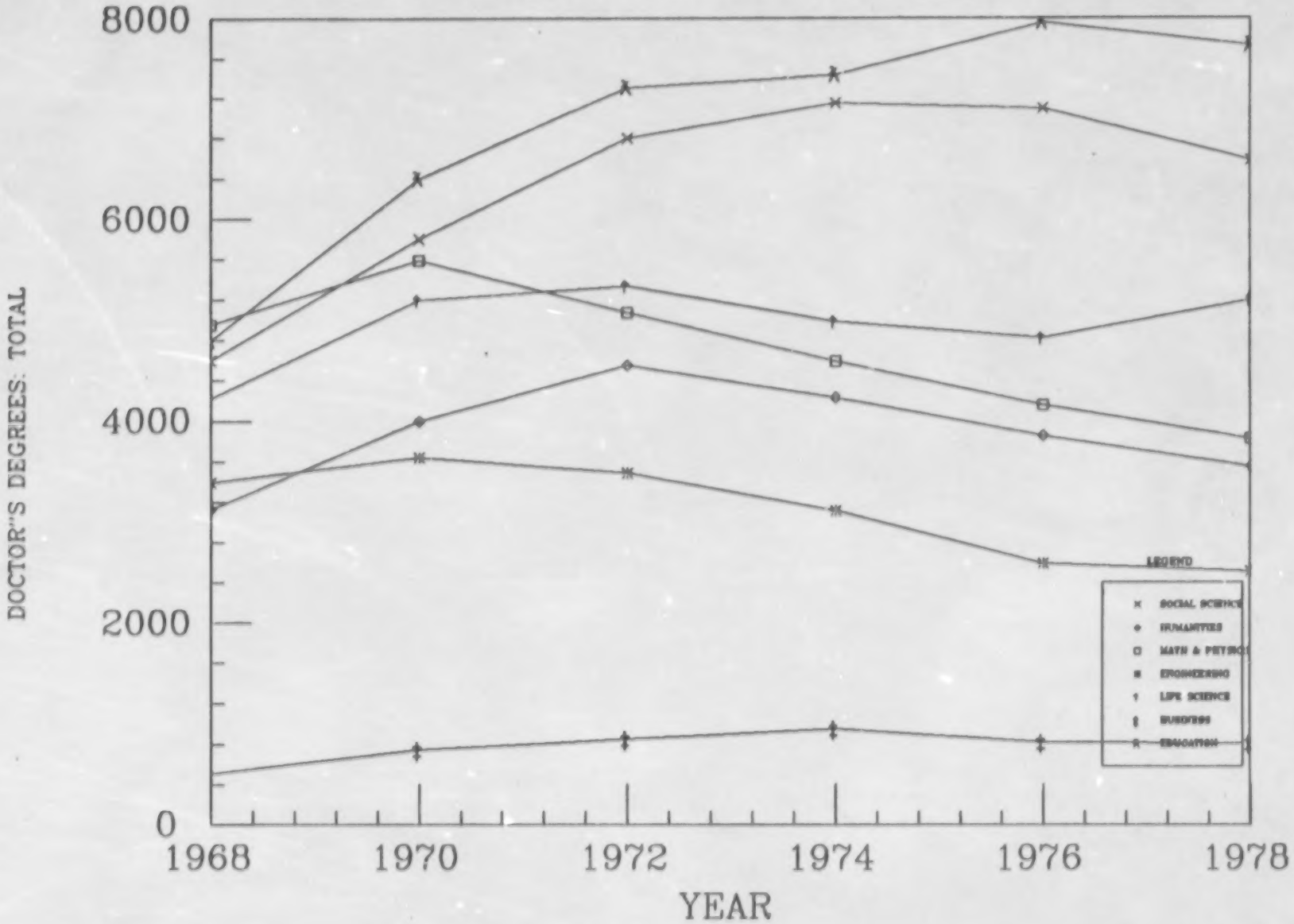

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Figure 8

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

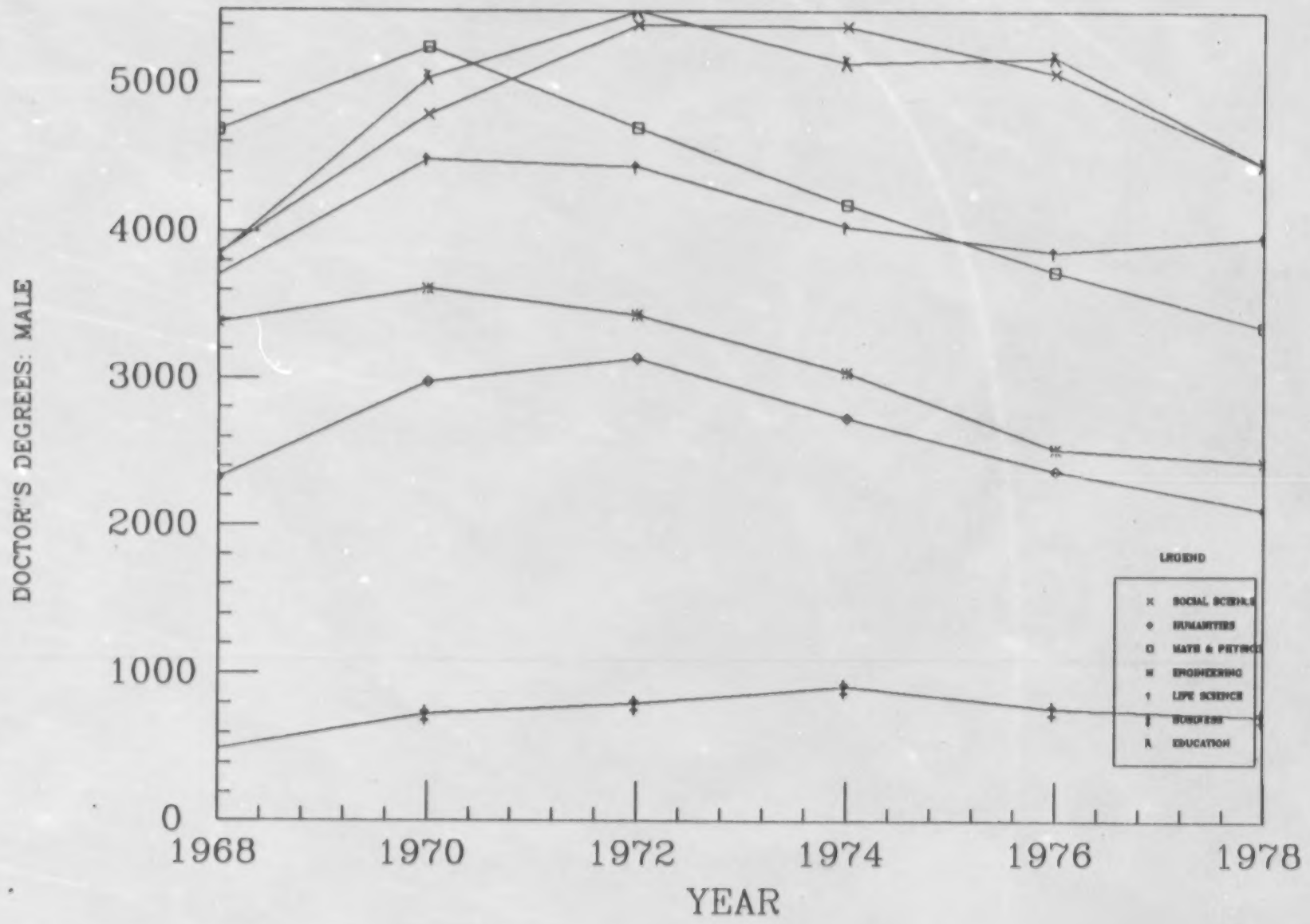

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Figure 9

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

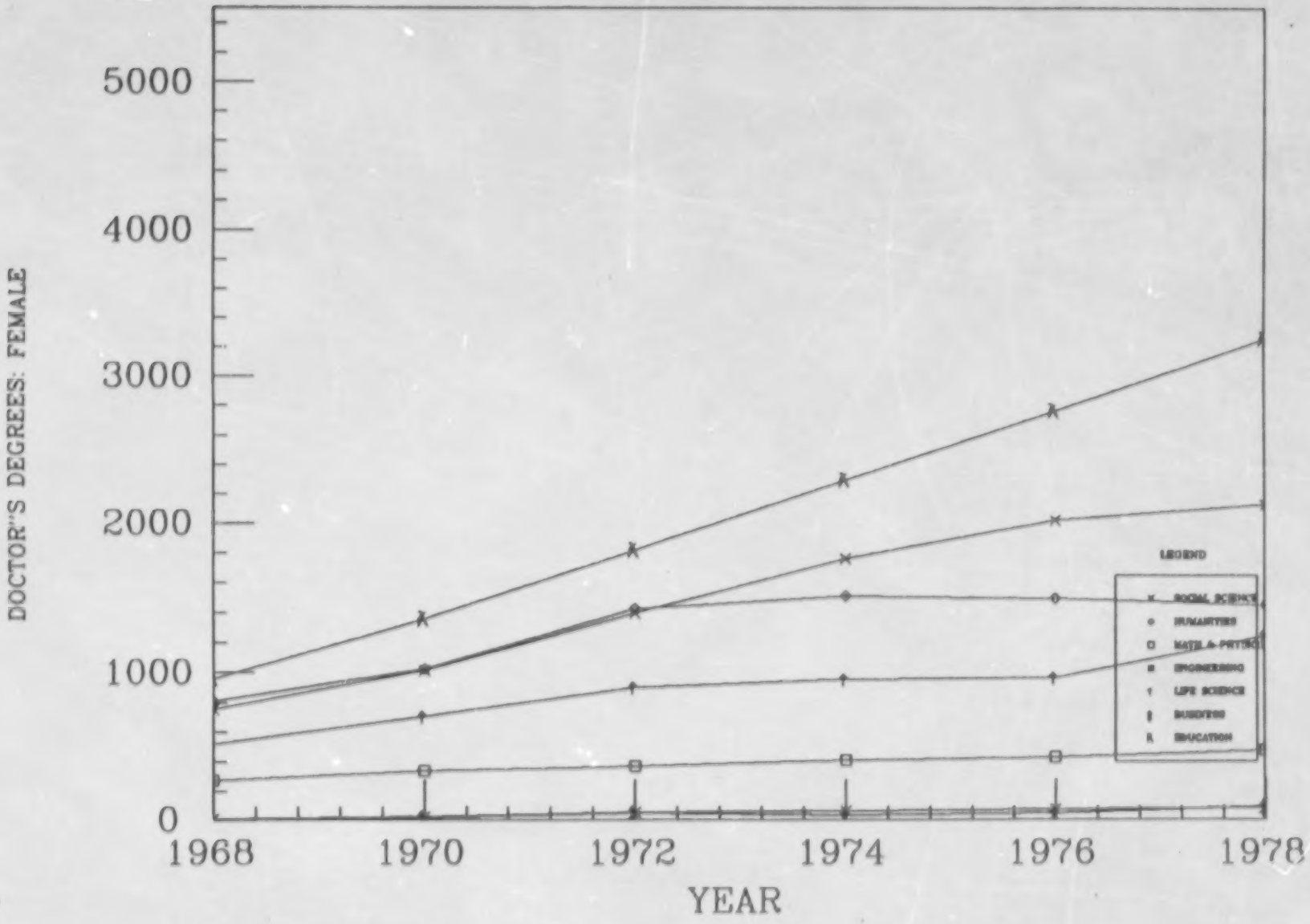
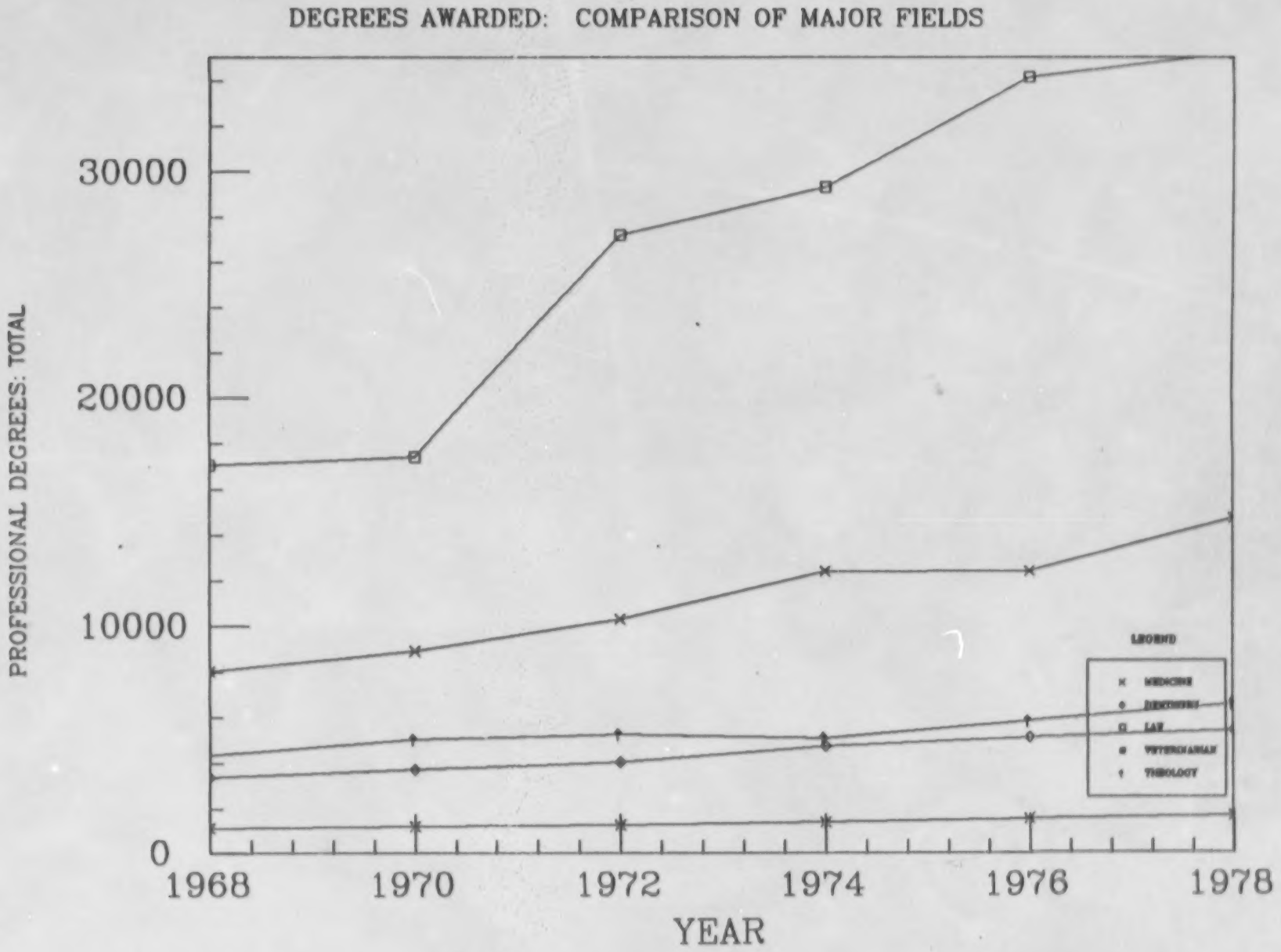


Figure 10

Source: Projections of Education Statistics



C-11

Figure 11

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

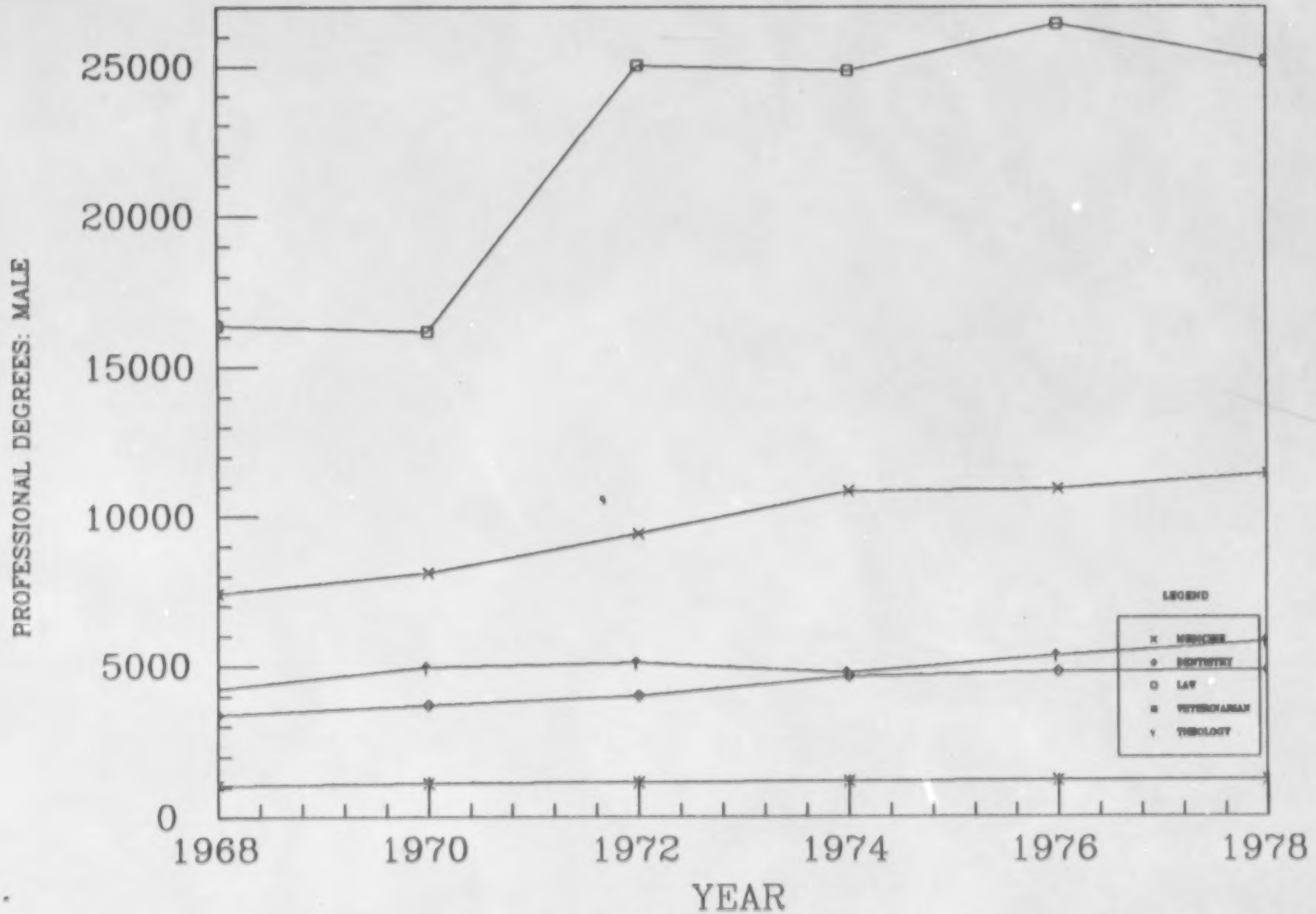


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Figure 12

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

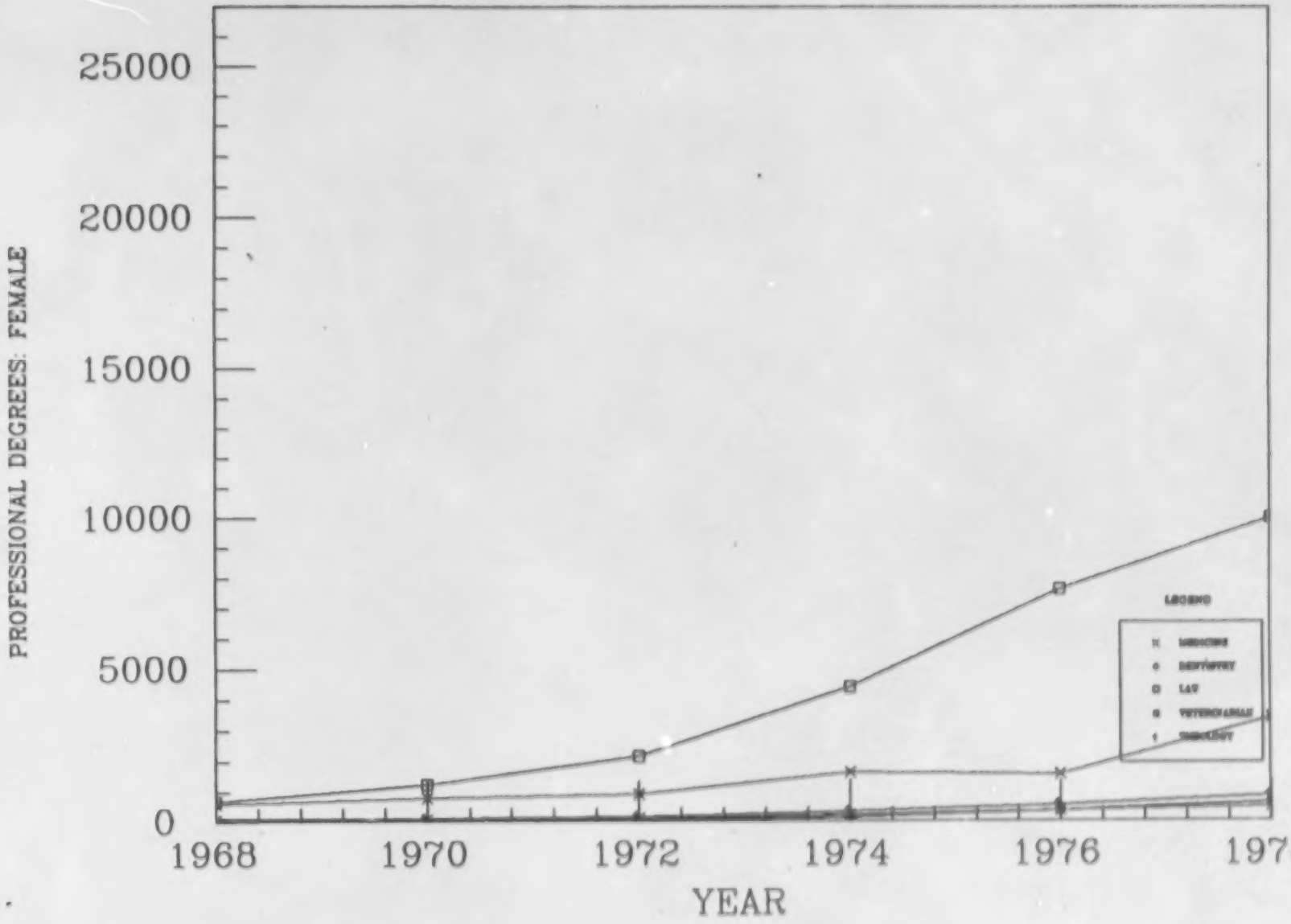

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Figure 13

79

Source: Projections of Educatoin Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

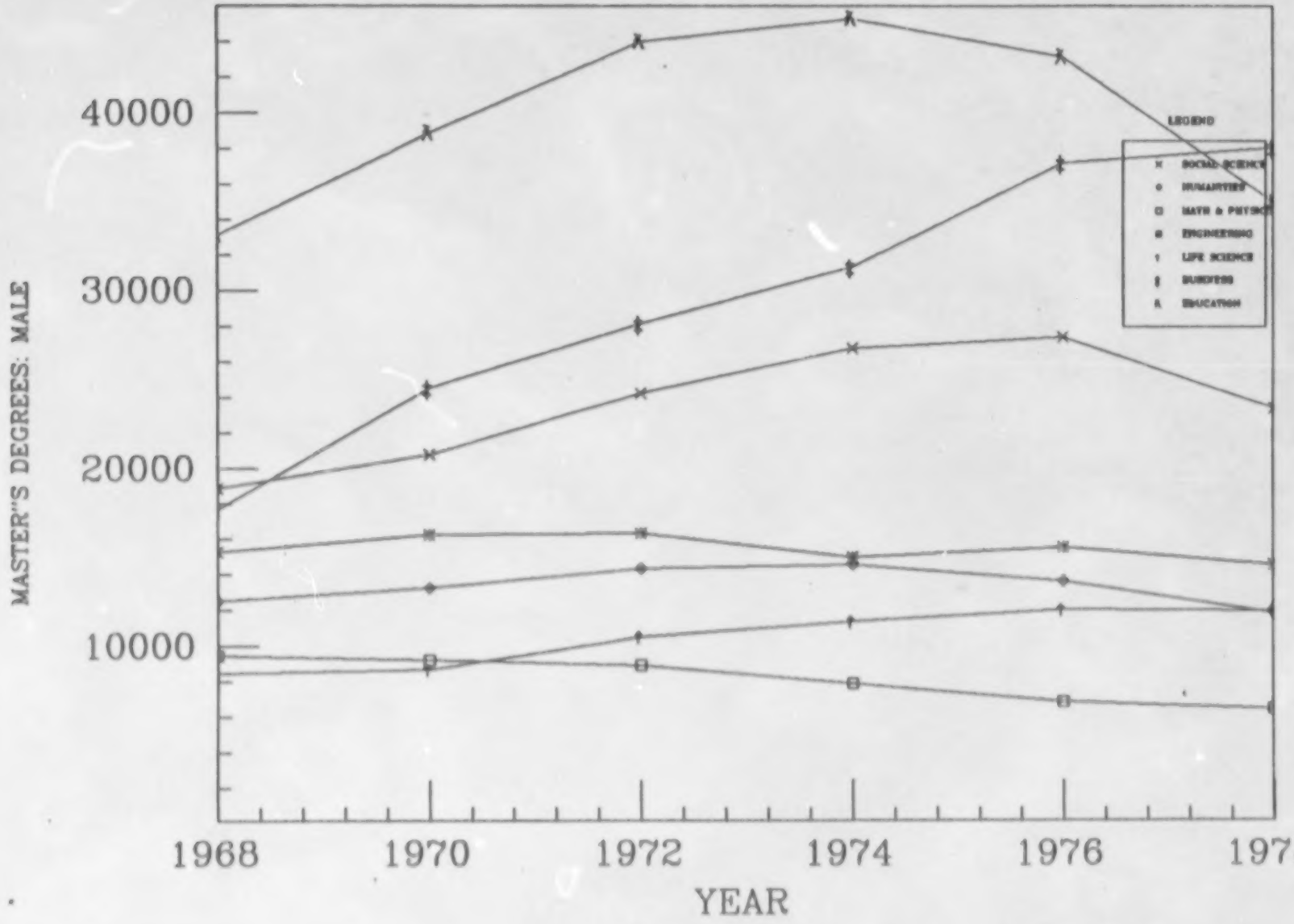

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Figure 14

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

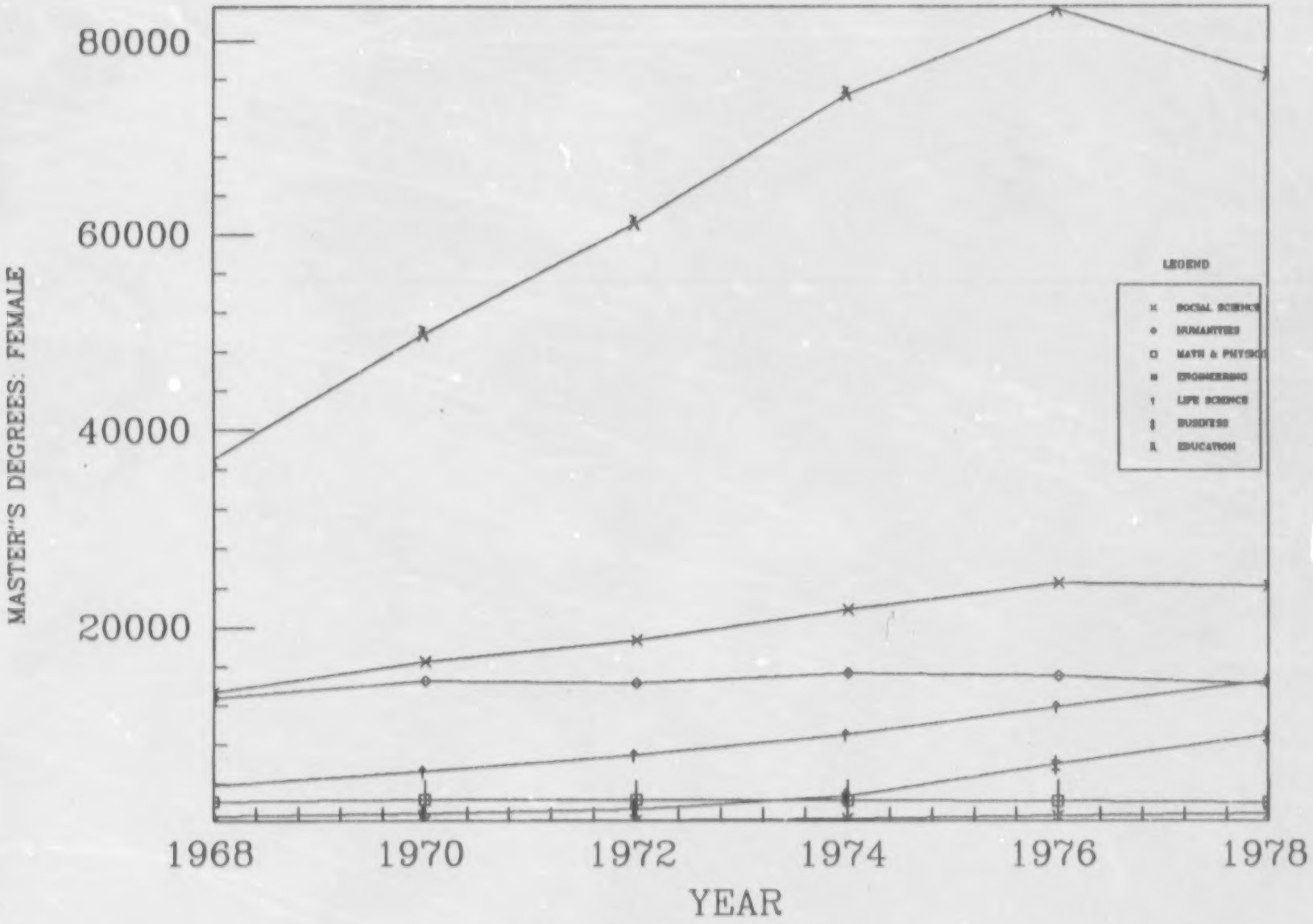

Figure 15

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

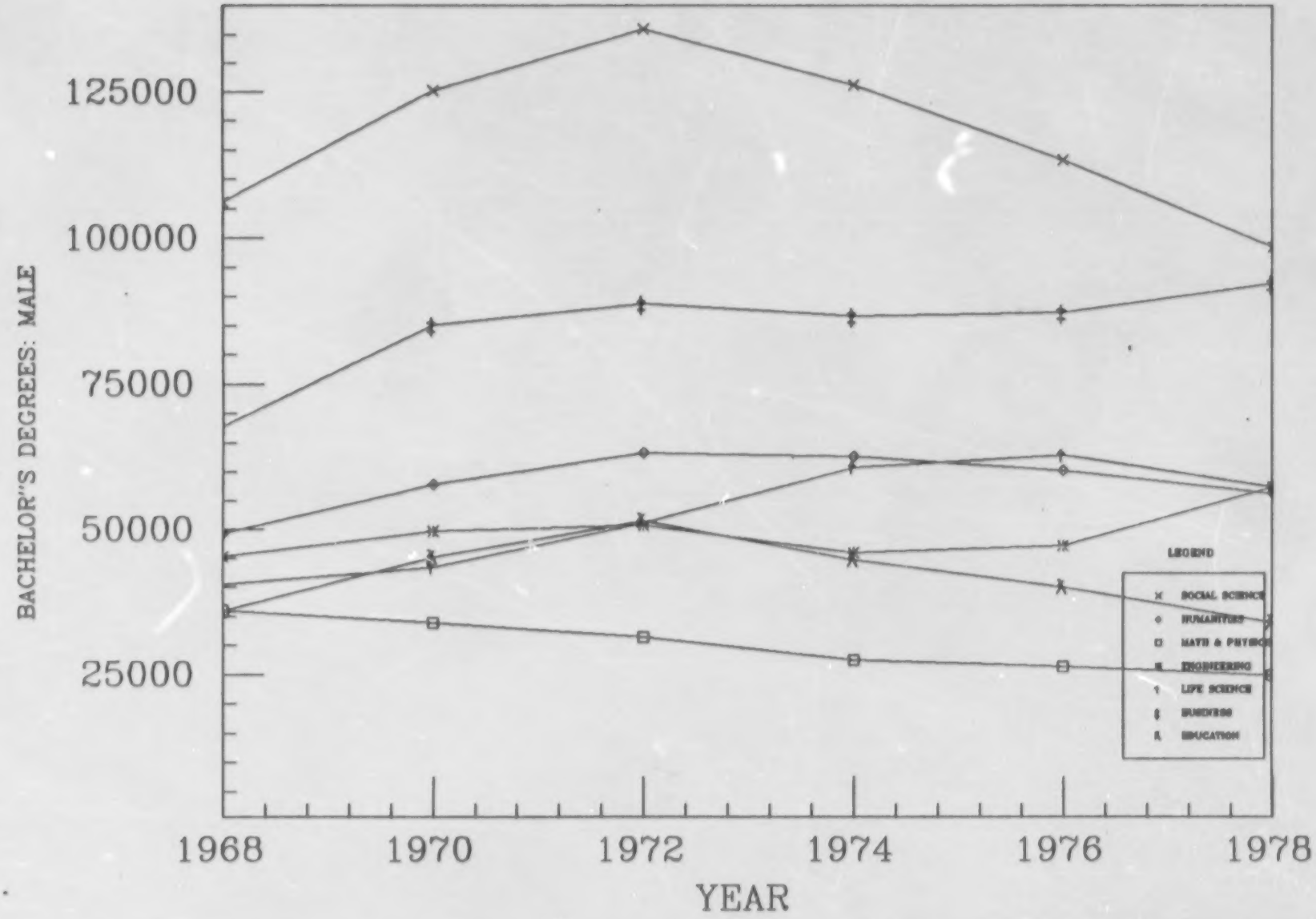

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Figure 16

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF MAJOR FIELDS

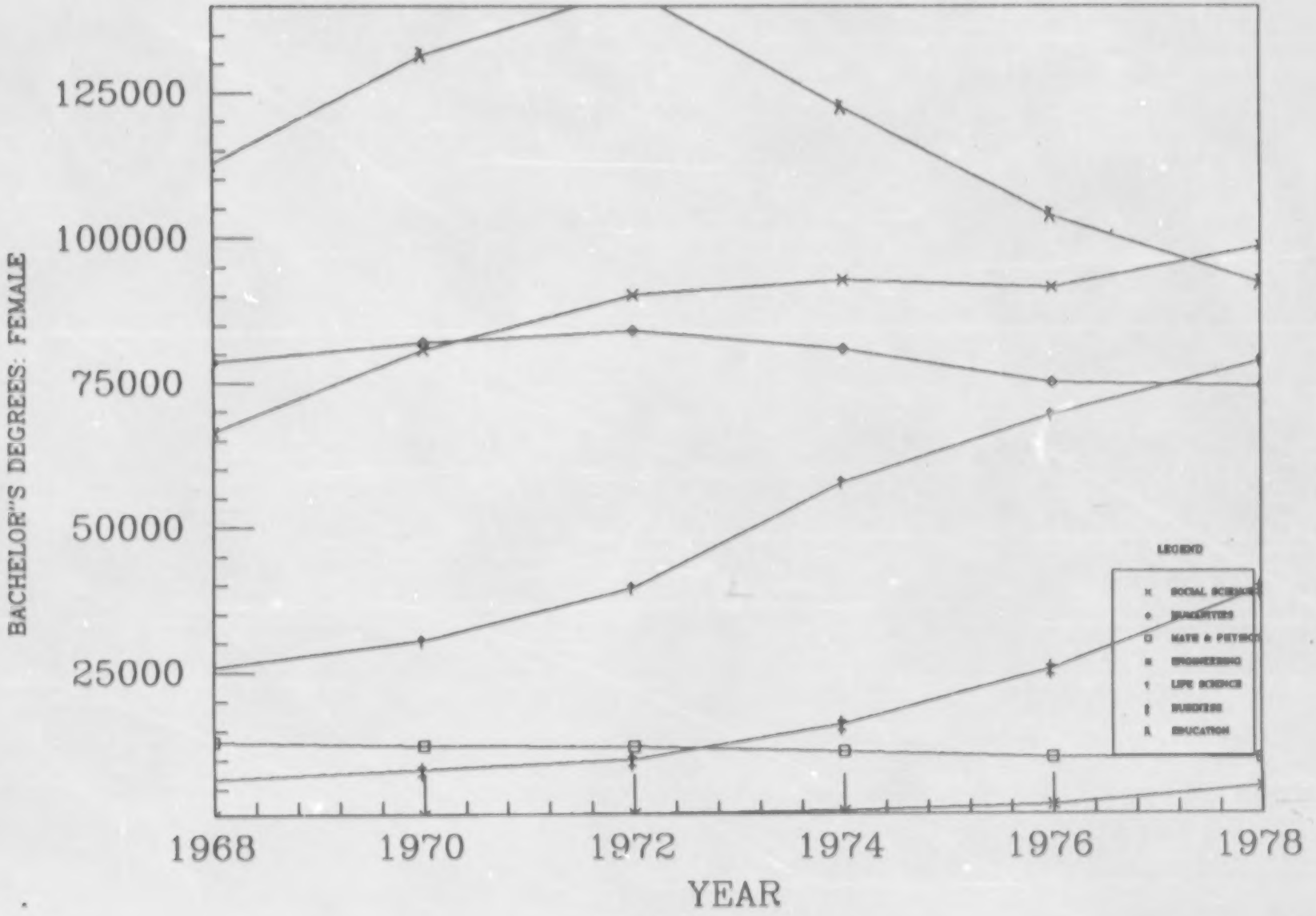
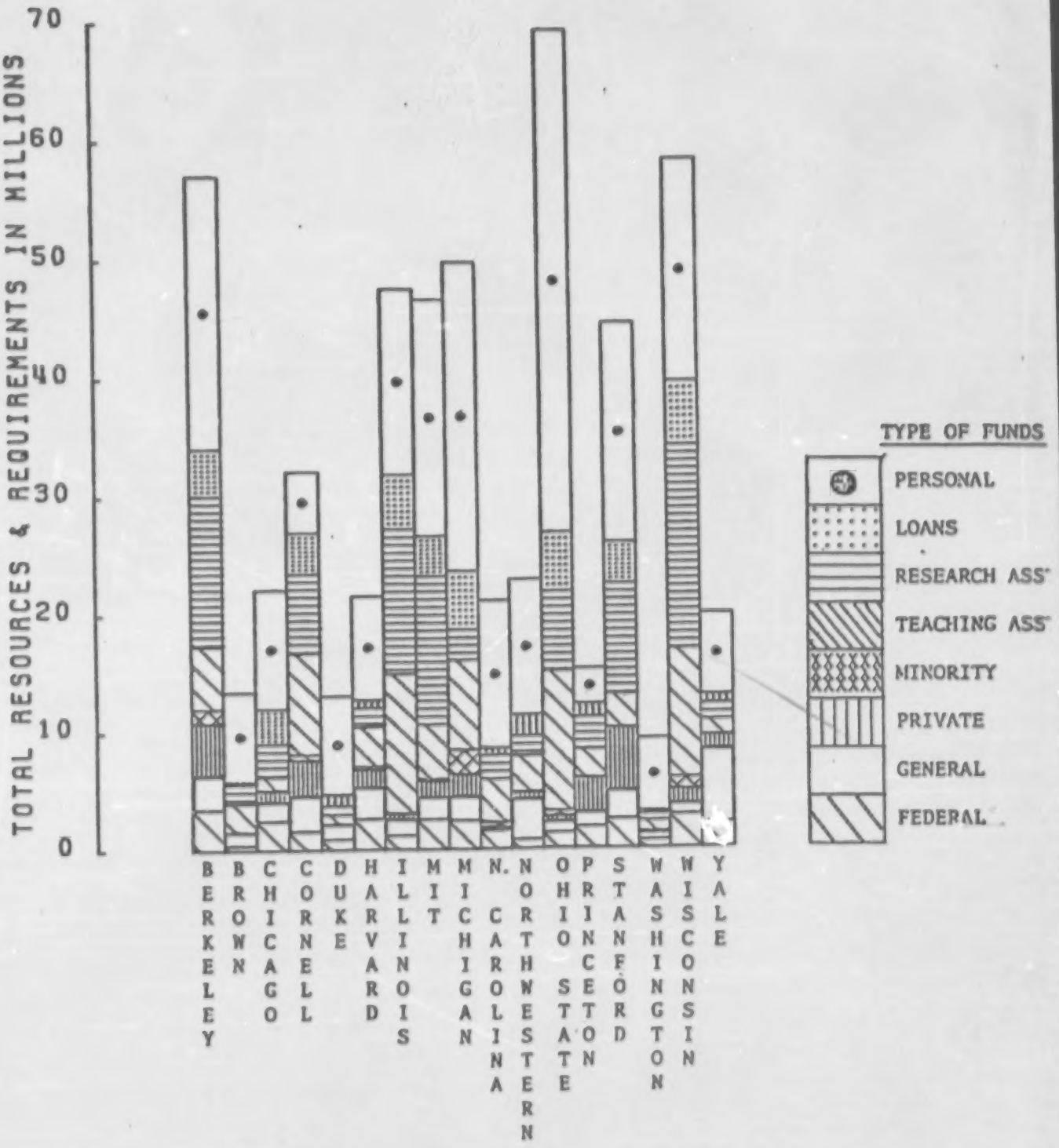
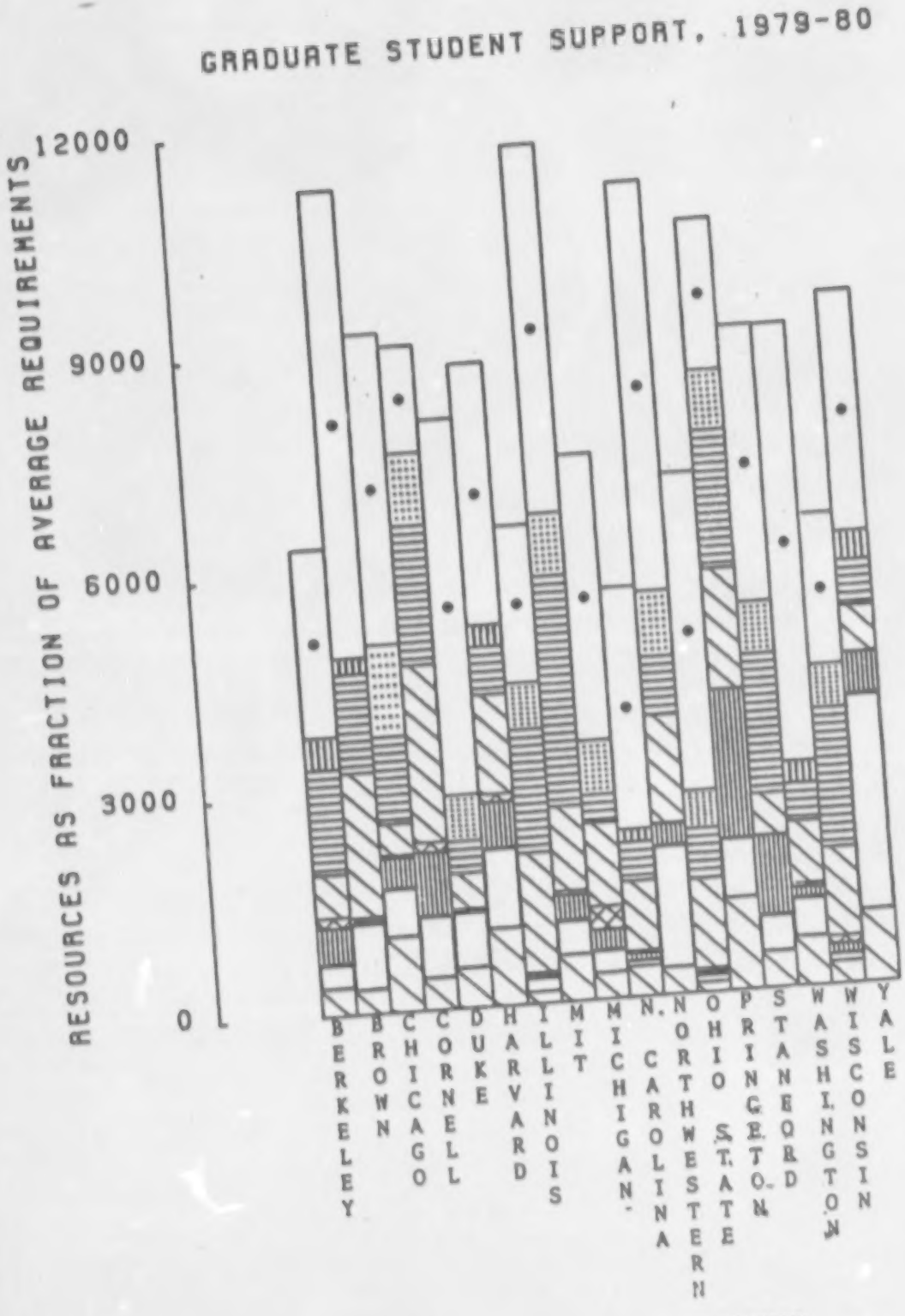


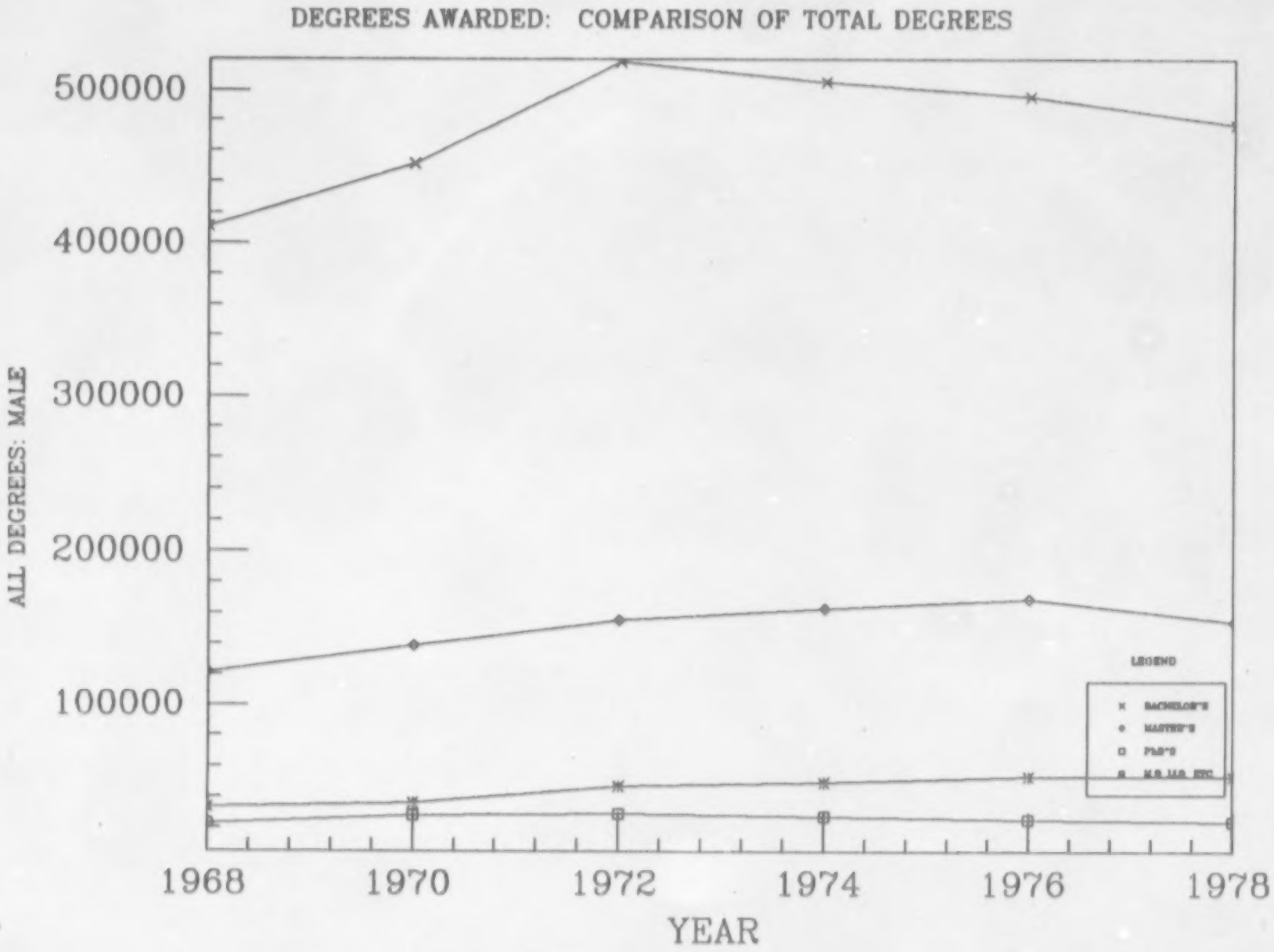
Figure 17

Source: Projections of Education Statistics

GRADUATE STUDENT SUPPORT, 1979-80




GRADUATE STUDENT SUPPORT, 1979-80
RESOURCES AS FRACTION OF AVERAGE REQUIREMENTS
12000
9000
6000
3000
0
BERKELEY
BROWN
CHICAGO
CORNELL
DUKE
HARVARD
ILLINOIS
MIT
MICHIGAN
N. CAROLINA
NORTHWESTERN
OHIO STATE
PRINCETON
STANFORD
WASHINGTON
WISCONSIN
YALE



C-18

Figure 18

Source: Projections of Education Statistics

DEGREES AWARDED: COMPARISON OF TOTAL DEGREES

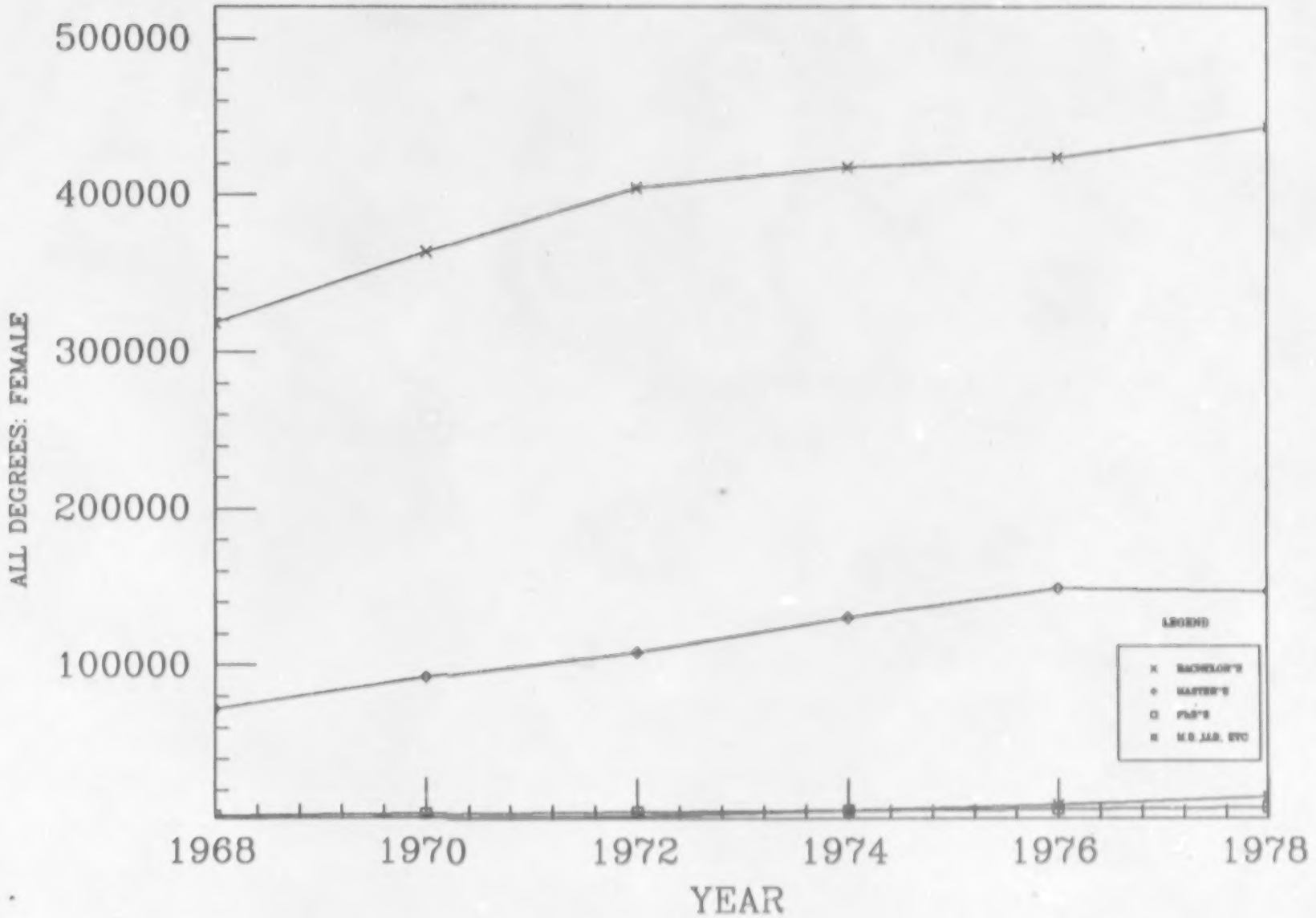


Figure 19

Source: Projections of Education Statistics

TABLE 1. Enrollment in Graduate and Professional Programs: Fall 1978.

Graduate Programs

	Total	Students Classified As Graduate Students	Unclassified Post-Baccalaureate
	1,317,291	1,078,079	239,212
Public	897,458	705,504	191,954
Private	419,833	372,575	47,258
Male	684,002	579,311	104,691
Female	633,289	498,768	134,521
Full-time	469,909	428,653	41,256
Part-time	847,302	649,426	197,956
Non-resident alien		73,628	
Black non-hispanic		61,923	
American Indian		3,786	
Asian		20,733	
Hispanic		25,183	
White non-hispanic		891,727	

First Professional Programs

Total	258,496
Public	105,885
Private	152,611
Male	193,280
Female	65,216
Full-time	233,970
Part-time	24,526
Non-resident alien	3,044
Black non-hispanic	11,424
American Indian	1,072
Asian	4,800
Hispanic	6,945
White non-hispanic	229,306

SOURCE: National Center for Education Statistics, Fall Enrollment in Higher Education, 1978. All data except ethnicity are adapted from Table 4 (OFE.) Data for ethnicity are adapted from Table 29 (OFE.)

NOTE: The totals for ethnicity differ from the totals given in the Table, because some institutions were unable to identify the race of students enrolled. See footnote 1, Table 29 of Fall Enrollment, 1978.

TABLE 2. Number of Departments offering Master's and Doctor's Degrees in selected academic disciplines: 1976-77.

	Master's	Doctor's
Biological Sciences	459	210
Business & Management	461	85
Communications	143	31
Computers & Information Science	144	49
Education	655	166
Engineering	234	139
Fine & Applied Arts	325	82
Foreign Languages	261	90
Health Professions	275	84
Letters	498	156
Library Science	118	20
Mathematics	379	141
Physical Sciences	369	194
Psychology	370	176
Public Affairs	270	43
Social Sciences	493	158

SOURCE: Data adapted from U.S. Department of Health, Education, and Welfare, Office of Civil Rights, Data on Earned Degrees Conferred from Institutions of Higher Education by Race, Ethnicity, and Sex, Academic Year 197o-77, April, 1978.

TABLE 3. Number of Departments offering Degrees in Selected First-Professional Fields.

Dentistry (D.D.S.)	58
Law (L.L.B. or J.D.)	171
Medicine (M.D.)	110
Theology (B.D., M.Div, Rabbi)	173

SOURCE: Data adapted from U.S. Department of Health, Education, and Welfare Office of Civil Rights, Data on Earned Degrees Conferred from Institutions of Higher Education by Race, Ethnicity, and Sex, Academic Year 1976-77, April, 1978.

TABLE 4. Doctor's degrees conferred by 60 large institutions of higher education

Institution	Rank order[2]	Total 1969-70 to 1978-79	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79
University of Wisconsin	1	8,029	900	915	796	836	848	853	828	700	865	888
University of California at Berkeley	2	7,954	823	759	848	891	825	785	794	754	766	709
University of Illinois	3	7,742	809	870	874	880	806	789	748	714	580	852
Columbia University (N.Y.)[3]	4	7,210	815	705	841	786	793	852	887	706	630	585
University of Michigan	5	7,197	866	809	796	751	743	722	686	705	635	880
Ohio State University	6	6,486	822	676	750	715	653	634	678	586	587	575
Harvard University (Mass.)	7	6,048	588	612	629	746	578	557	620	625	580	533
Michigan State University	8	5,833	675	731	633	686	585	603	535	504	437	484
Indiana University	9	5,592	581	623	608	597	609	590	581	496	439	488
University of Minnesota	10	5,390	546	613	599	557	572	539	494	511	493	486
New York University	11	5,344	519	574	608	725	589	492	539	423	437	458
University of California at Los Angeles	12	5,322	615	570	568	597	532	487	509	484	485	495
Stanford University (Calif.)	13	5,232	505	582	557	566	522	524	490	460	490	527
University of Texas	14	4,991	418	488	523	514	522	581	535	542	453	455
Cornell University (N.Y.)[4]	15	4,804	494	521	478	531	498	488	487	449	467	415
University of Southern California	16	4,687	393	453	475	600	497	448	481	458	427	435
Purdue University (Ind.)	17	4,482	578	498	493	441	454	487	420	378	381	374
Massachusetts Institute of Technology	18	4,177	439	400	418	396	480	469	390	379	425	381
Pennsylvania State University	19	4,108	379	436	521	424	378	404	458	400	340	370
University of Chicago (Ill.)	20	4,100	361	434	448	468	466	440	405	380	370	328
University of Pennsylvania	21	3,774	373	378	441	402	412	358	422	322	335	331
University of Pittsburgh (Pa.)	22	3,761	315	326	374	419	410	422	388	365	384	380
University of Washington	23	3,714	342	432	379	446	382	386	365	330	310	342
University of Maryland	24	3,687	350	339	402	364	343	400	389	399	334	367
University of Missouri	25	3,540	362	361	405	406	405	364	372	352	226	297
Northwestern University (Ill.)	26	3,534	380	404	370	392	388	393	333	301	292	301
Yale University (Conn.)	27	3,409	348	345	348	352	356	369	346	300	322	323
Florida State University	28	3,314	286	314	384	363	356	361	300	324	303	343
University of Iowa	29	3,240	319	389	343	347	311	330	324	274	297	306
Rutgers, The State University (N.J.)	30	3,183	245	233	305	319	292	353	335	395	339	367
University of Florida	31	3,064	296	303	300	260	273	353	349	319	296	313
University of North Carolina at Chapel Hill	32	3,013	241	278	315	317	332	332	299	305	294	300
University of Massachusetts	33	2,989	153	263	236	344	332	331	334	332	348	316
University of Tennessee	34	2,774	236	286	282	321	332	298	260	277	231	251
University of Colorado	35	2,750	251	252	301	266	299	286	292	303	259	241
University of Georgia	36	2,729	197	256	293	312	299	297	288	258	277	252
University of Oregon	37	2,664	273	260	343	336	278	295	260	239	182	198
University of Kansas	38	2,597	268	260	241	267	288	287	242	229	263	252
Syracuse University (N.Y.)	39	2,511	290	257	267	295	268	230	237	235	219	213
Iowa State University of Science and Technology	40	2,510	296	311	277	287	247	207	228	222	208	227
Boston University (Mass.)	41	2,482	218	214	205	291	226	266	288	243	259	274
Texas A&M University	42	2,463	216	215	240	241	234	268	243	287	262	257
Princeton University (N.J.)	43	2,418	238	255	262	216	259	252	247	223	224	242
State University of New York at Buffalo	44	2,394	248	249	217	274	237	238	253	213	227	238
University of Utah	45	2,238	248	238	279	224	252	245	207	216	181	168
University of Arizona	46	2,216	214	245	212	209	218	218	215	236	232	217
Case Western Reserve University (Ohio)	47	2,213	295	327	245	238	220	207	176	184	165	156
Johns Hopkins University (Md.)	48	2,204	223	212	212	251	236	241	217	198	218	196
University of Virginia	49	2,193	176	226	181	209	237	236	241	225	231	228
Wayne State University (Mich.)	50	2,121	190	208	229	258	216	220	213	207	183	197
Duke University (N.C.)	51	2,109	223	220	237	193	222	217	209	204	209	175
University of Nebraska	52	2,107	213	222	208	228	237	219	177	216	198	189
Oklahoma State University	53	2,090	218	218	230	230	214	213	200	175	203	189
University of Oklahoma	54	2,086	245	224	241	240	218	249	195	198	128	148
Temple University (Pa.)	55	2,040	113	148	183	220	166	251	208	227	289	237
University of Rochester (N.Y.)	56	1,937	215	203	188	206	210	189	163	190	174	199
University of California at Davis	57	1,933	154	192	203	208	228	193	208	201	151	195
Nova University (Fla.)	58	1,909	5	4	3	- - -	10	282	476	378	352	399
Louisiana State University	59	1,840	198	221	253	186	221	182	147	156	132	144
University of Connecticut	60	1,838	149	158	204	176	191	193	217	200	189	161

[1] Includes Ph.D., Ed.D., and comparable degrees at the doctoral level. Excludes first-professional degrees (e.g., M.D., D.D.S., and D.V.M.).

[2] Institutions are ranked by the total number of doctor's degrees conferred during the 10-year period 1969-70 to 1978-79.

[3] Includes degrees conferred by the Main Division and Teachers College.

[4] Includes degrees conferred by the Endowed and Statutory Colleges.

SOURCE: U.S. Department of Education, National Center for Education Statistics, special tabulations from *Earned Degrees Conferred*.

SOURCE: The data are adapted from Digest of Educational Statistics, 1981, Table 124.

TABLE 5. Mean Baccalaureate-to-Doctorate Time Lapse for students receiving their doctorates over the period 1960-1974.

Field of Doctorate	Males	Females	Both
Mathematics	7.41	8.61	7.49
Physics and Astronomy	7.48	8.01	7.49
Chemistry	6.73	7.51	6.69
Earth Sciences	8.89	9.78	8.91
Engineering	8.37	8.57	8.38
EMP TOTAL	7.72	8.01	7.73
Life Sciences	8.36	9.27	8.48
NATURAL SCIENCE TOTAL	7.92	8.84	7.99
Psychology	8.00	10.31	8.55
Social Sciences	9.83	11.73	10.06
BEHAVIORAL SCIENCE TOTAL	9.12	10.88	9.42
Humanities	10.81	12.89	11.25
Education	13.71	16.74	14.36
TOTAL, ALL FIELDS	9.62	12.68	10.05

The data are adapted from National Research Council, A Century of Doctorates, 1978, Table 21, p. 55.

TABLE 6.

Master's Degrees Conferred by Large Institutions of Higher Education: 1973-74

Institution	Rank	Number of Master's Degrees Granted
New York University	1	4,072
University of Michigan, Ann Arbor	2	3,484
University of Southern California	3	2,981
University of Illinois, Urbana Campus	4	2,645
Indiana State University at Bloomington	5	2,538
Michigan State University	6	2,336
Wayne State University	7	2,286
University of California, Berkeley	8	2,136
George Washington University	9	2,118
University of Wisconsin, Madison	10	2,080
Ohio State University, Main Campus	11	2,049
Boston University	12	2,045
University of Pittsburgh, Main Campus	13	2,035
Columbia University, Main Division	14	2,032
Harvard University	15	2,009
Georgia State University	16	1,895
Ball State University (Indiana)	17	1,780
University of Georgia	18	1,770
University of California, Los Angeles	19	1,767
University of Washington	20	1,717
Eastern Michigan University	21	1,686
University of Chicago	22	1,636
University of Pennsylvania	23	1,613

SOURCE: The data are adapted from National Center for Educational Statistics, Earned Degrees Conferred, 1973-74, Institutional Data, Table 5.

TABLE 6 (continued)
Master's Degrees

1973-74

Institution	Rank	Number of Master's Degrees Granted
Stanford University	24	1,594
Temple University, Main Campus	25	1,588
Northern Illinois University	26	1,522
Syracuse University, Main Campus	27	1,522
University of Hawaii, Manoa	28	1,423
Western Michigan State	29	1,419
Pennsylvania State University, Main Campus	30	1,417
University of Maryland, College Park Campus	31	1,395
Purdue University, Main Campus	32	1,369
Rutgers University, New Brunswick	33	1,338
University of Minnesota, Minneapolis/St. Paul	34	1,328
University of Tennessee, Knoxville	35	1,328
Florida State University	36	1,327
Northwestern University	37	1,318
University of Missouri, Columbia	38	1,312
SUNY State University at Albany	39	1,300
CUNY, Queens College	40	1,292
West Virginia University	41	1,292
Arizona State University	42	1,277
University of Colorado, Main Campus	43	1,276
University of Florida	44	1,253
CUNY, Hunter College	45	1,252
University of Texas at Austin Main Campus	46	1,238
University of North Carolina, Chapel Hill	47	1,230
California State University, San Francisco	48	1,200
CUNY, Brooklyn College	49	1,195

TABLE 6(continued)
Master's Degree

1973-74

Institution	Rank	Number of Master's Degrees Granted
University of Iowa	50	1,192
University of Utah	51	1,180
University of Oklahoma, Norman Campus	52	1,174
Adelphi University	53	1,164
Long Island University, Post Center	54	1,148
University of Virginia, Main Campus	55	1,127
SUNY State University, Stony Brook - Main	56	1,103
University of Northern Colorado	57	1,100
SUNY State University, Buffalo Main Campus	58	1,087
California State University, Los Angeles	59	1,073
California State University, San Jose	60	1,067
Long Island University, Brooklyn Center	61	1,054
Northeastern University	62	1,054
Fordham University	63	1,049
University of Oregon, Main Campus	64	1,045
Yale University	65	1,031
Southern Connecticut State College	66	1,025
University of Wisconsin, Milwaukee	67	1,025
Central Michigan University	68	1,024
University of Massachusetts, Amherst Campus	69	1,021
University of South Carolina Main Campus	70	1,013
Johns Hopkins University	71	1,003

TABLE 7

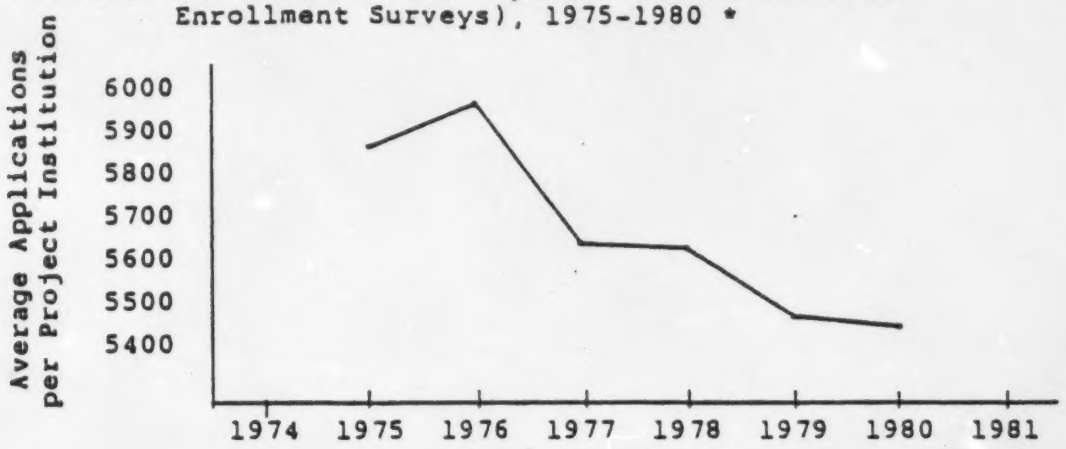
TOTAL NUMBER OF AND AVERAGE GRADUATE APPLICATIONS FOR GRADUATE STUDY (at Council of Graduate Schools (CGS) Institutions responding to the CGS Fall Enrollment Surveys)

Year	Number of Responding Institutions	Total Number of Applications	Average Graduate Applications per Responding Institution
1974	243 ┐	555,177	2,285
1975	243 ┘	590,872	2,432
	255 ┐	581,164	2,279
1976	255 ┘	588,568	2,308
	264 ┐	510,976	1,936
1977	264 ┘	510,976	1,936
	262 ┐	530,714	2,025
1978	262 ┘	522,191	1,993
	264 ┐	527,153	1,997
1979	264 ┘	511,410	1,937
	236 ┐	466,796	1,978
1980	236 ┘	458,356	1,942
	234 ┐	410,714	1,755
1981	234 ┘	412,861	1,764

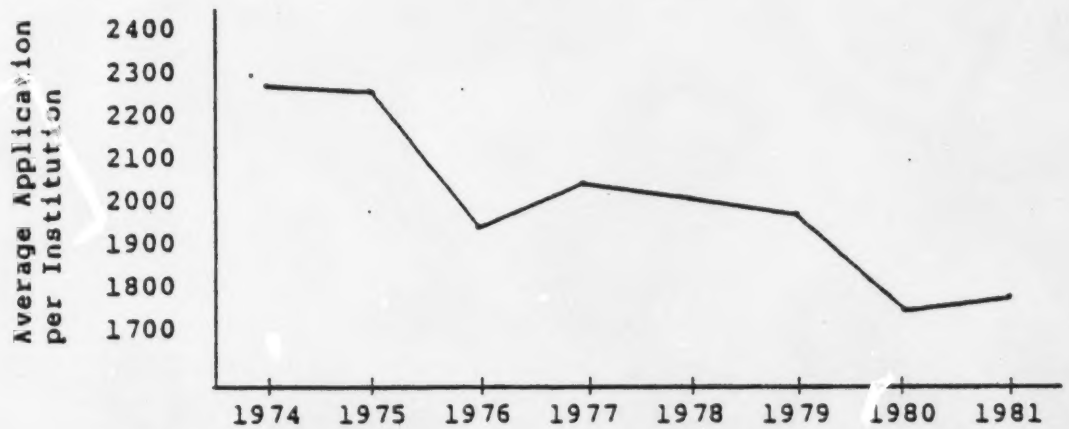
Footnote: The symbol] denotes a single survey conducted in the fall of the more recent year.

Source: Data from Council of Graduate Schools (CGS) Fall Enrollment Surveys, 1975-1981. Averages computed by COFHE Graduate Research Project. Graduate Admission Trends, March, 1982

AVERAGE NUMBER OF APPLICATIONS FOR GRADUATE STUDY AT PROJECT INSTITUTIONS (as reported in the CGS Fall Enrollment Surveys), 1975-1980 *



AVERAGE NUMBER OF APPLICATIONS FOR GRADUATE STUDY, 1974-1981 (at Council of Graduate Schools (CGS) Institutions responding to the CGS Fall Enrollment Surveys) *



Source: Data from Council of Graduate Schools (CGS) Fall Enrollment Surveys 1975-1980. Calculations and graphs by COFHE Graduate Research Project.

* : For years 1975 through 1980 the more recently reported figures were used to calculate the averages per institution. The number of CGS institutions responding to the surveys varied from year to year. CGS institutions' averages for each year are based on the number of respondents for that year. Project institutions' averages are based on the same thirteen institutions each year -- those with reported survey data for 1975 through 1980: Brown, Bryn Mawr, Cornell, Duke, M.I.T., Princeton, Stanford, U.C. Berkeley, U. of Chicago, U. of North Carolina, U. of Pennsylvania and Yale. U. of Michigan is included in the calculated averages for total graduate enrollment.

TABLE 9.

TOTAL AND AVERAGE FIRST-TIME GRADUATE ENROLLMENT, 1974-1981
(at Council of Graduate Schools (CGS) Institutions
responding to the CGS Fall Enrollment Surveys)

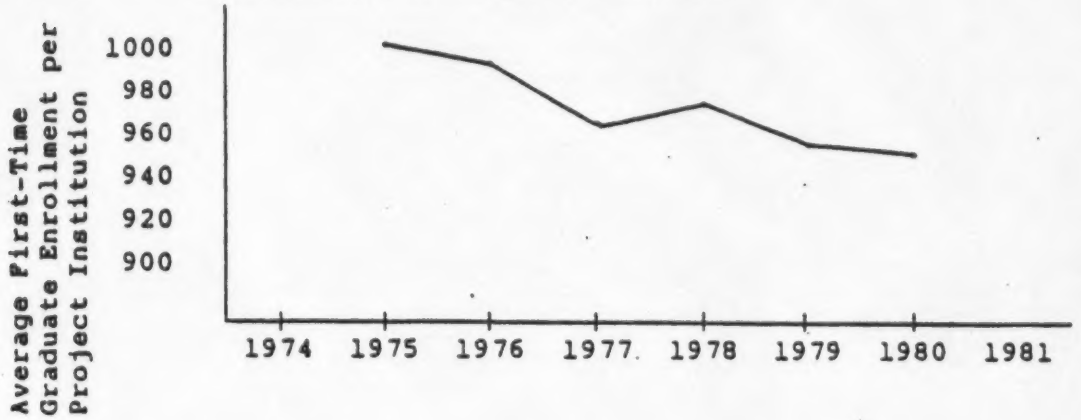
Year	Number of Responding Institutions	Total Number of First-Time Students	Average Number First-Time Students per Responding Institution
1974	274 ┐	182,183	688
1975	274 ┘	188,573	688
	281 ┐	186,662	664
1976	281 ┘	179,515	639
	284 ┐	165,555	583
1977	284 ┘	167,421	590
	276 ┐	170,664	618
1978	276 ┘	166,538	603
	277 ┐	156,571	565
1979	277 ┘	154,337	557
	249 ┐	143,313	576
1980	249 ┘	146,679	589
	255 ┐	141,518	555
1981	255 ┘	138,625	543

Footnote: The symbol] denotes a single survey conducted in the fall of the more recent year.

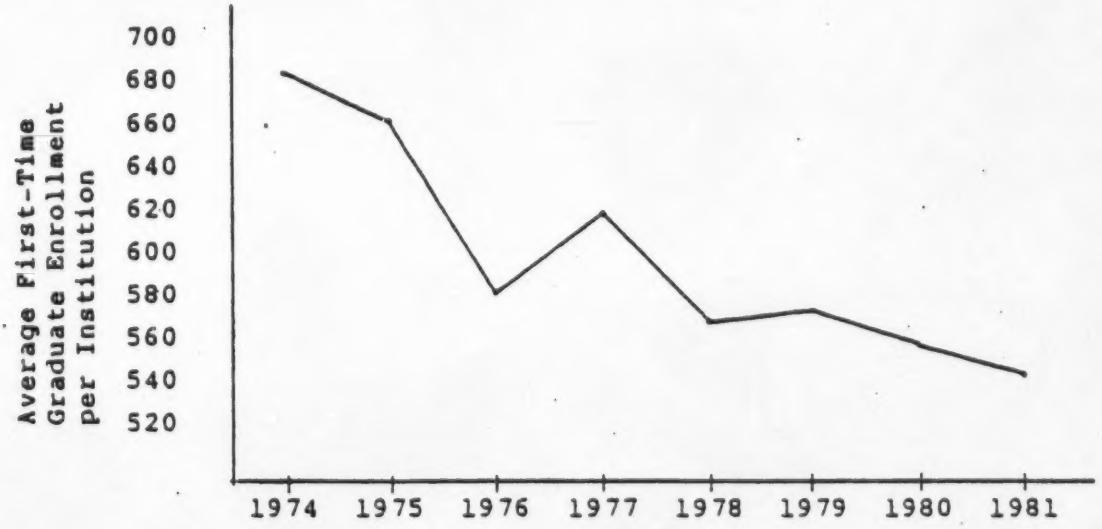
Source: Data from Council of Graduate Schools (CGS) Fall Enrollment Surveys, 1975-1981. Averages computed by COFHE Graduate Research Project.

TABLE 10:

AVERAGE FIRST-TIME GRADUATE ENROLLMENT AT PROJECT INSTITUTIONS (as reported in the CGS Fall Enrollment Surveys), 1975-1980 *



AVERAGE FIRST-TIME GRADUATE ENROLLMENT (at Council of Graduate Schools (CGS) Institutions responding to the CGS Fall Enrollment Surveys) *



Source: Data from Council of Graduate Schools (CGS) Fall Enrollment Surveys 1975-1980. Calculations and graphs by COFHE Graduate Research Project.

* : For years 1975 through 1980 the more recently reported figures were used to calculate the averages per institution. The number of CGS institutions responding to the surveys varied from year to year. CGS institutions' averages for each year are based on the number of respondents for that year. Project institutions' averages are based on the same thirteen institutions each year -- those with reported survey data for 1975 through 1980: Brown, Bryn Mawr, Cornell, Duke, M.I.T., Princeton, Stanford, U.C. Berkeley, U. Chicago, U. North Carolin U. Pennsylvania and Yale. U. of Michigan is included in the calculated averages for total graduate enrollment.

TABLE 11.

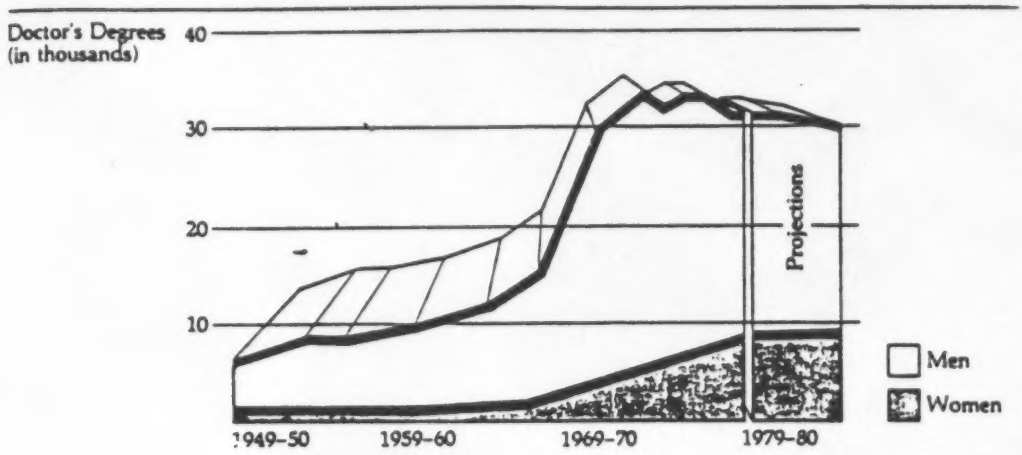
COFHE Graduate Research Project Institutions

Brown University
Bryn Mawr College
Columbia University
Cornell University
Duke University
Harvard University
Johns Hopkins University
Massachusetts Institute of Technology
Northwestern University
Princeton University
Smith College
Stanford University
University of California at Berkeley
University of Chicago
University of Michigan
University of North Carolina at Chapel Hill
University of Pennsylvania
University of Rochester
Washington University
Yale University

The Departments were categorized as follows:

Social Science	Science	Engineering	Humanities
Anthropology	Biochemistry	Chemical Eng.	Classics
Economics	Geology	Mechanical Eng.	English
Linguistics	Mathematics		Fine Arts
Political Science	Physics		French
Psychology	Statistics		German
Sociology			History
			Music
			Philosophy
			Slavic

TABLE 12. Doctor's Degrees, by Sex of Student and by Control of Institution, Selected Years, 1947-48, 1984-85.



Year	Earned Doctor's Degrees[a]				
	Total	Men	Women	Public	Private
1947-48	3,989	3,496	493	1,580	2,409
1949-50	6,420	5,804	616	2,668	3,752
1951-52	7,683	6,969	714	3,469	4,214
1953-54	8,996	8,181	815	4,656	4,340
1954-55	8,840	8,014	826	4,560	4,280
1955-56	8,903	8,018	885	4,583	4,320
1957-58	8,942	7,978	964	4,614	4,328
1959-60	9,829	8,801	1,028	5,098	4,731
1961-62	11,622	10,377	1,245	6,296	5,326
1963-64	14,490	12,955	1,535	8,194	6,296
1964-65	16,467	14,692	1,775	9,472	6,995
1965-66	18,239	16,121	2,118	10,774	7,465
1967-68	23,091	20,185	2,906	14,157	8,934
1969-70	29,872	25,892	3,980	19,189	10,683
1970-71	32,113	27,534	4,579	20,794	11,319
1971-72	33,369	28,095	5,274	21,782	11,587
1972-73	34,790	28,575	6,215	22,370	12,420
1973-74	33,826	27,374	6,452	21,817	12,009
1974-75	34,086	26,819	7,267	22,179	11,907
1975-76	34,076	26,273	7,803	21,763	12,313
1976-77	33,244	25,150	8,094	21,241	12,003
1977-78	32,156	23,669	8,487	20,471	11,685
1978-79	32,756	23,555	9,201	20,831	11,925
	Projections				
1979-80	32,750	23,600	9,150	na	na
1980-81	32,980	23,710	9,270	na	na
1984-85	30,410	21,710	8,700	na	na

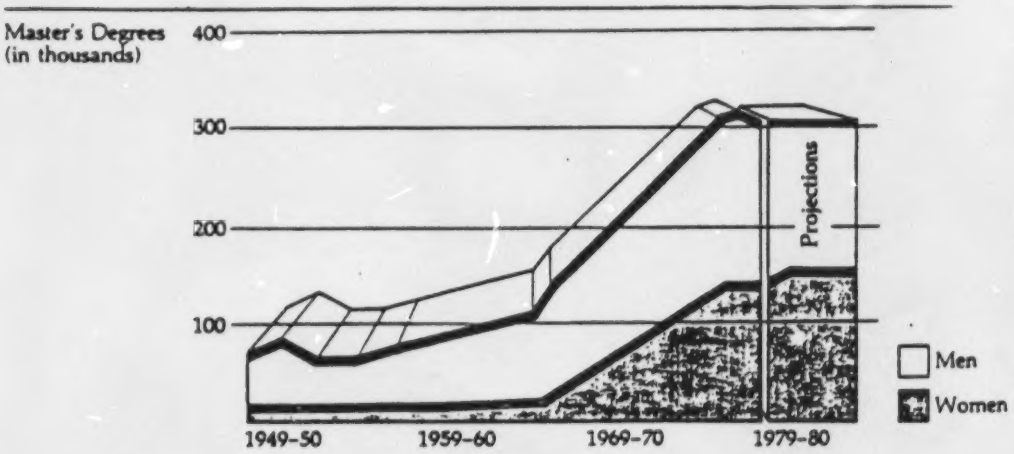
Note: Data prior to 1979-80 are for aggregate U.S. (fifty states, D.C., and outlying parts) except where footnoted otherwise; projections are intermediate projections for the fifty states and D.C. Tables showing percent distribution are found on pages 152 and 153.

na Not available.

a Doctorates included in addition to the Ph.D. are degrees such as Ed.D., S.T.D., and Sc.D. Excluded are honorary doctorates and the first professional degrees such as M.D., D.D.S., and D.V.M.

Sources:
1 USOE/NCES earned degree series. See page 145.
2 NCES, *Projections of Education Statistics to 1988-89* (Washington: GPO, 1980), p. 62.

. TABLE 13. Master's Degrees, by Sex of Student and by Control of Institution, Selected Years, 1947-48, 1984-85.



Year	Master's Degrees[a]				
	Total	Men	Women	Public	Private
1947-48	42,449	28,939	13,510	17,696	24,753
1949-50	58,219	41,237	16,982	26,192	32,027
1951-52	63,587	43,591	19,996	31,527	32,060
1953-54	56,823	38,147	18,676	30,701	26,122
1954-55	58,204	38,740	19,464	32,291	25,913
1955-56	59,294	39,397	19,897	33,095	26,199
1957-58	65,614	44,252	21,362	37,954	27,660
1959-60	74,497	50,937	23,560	42,991	31,506
1961-62	84,889	58,705	26,184	50,663	34,226
1963-64	101,122	69,012	32,110	62,363	38,759
1964-65	112,195	76,211	35,984	68,199	43,996
1965-66	140,772	93,184	47,588	84,313	56,459
1967-68	177,150	113,749	63,401	112,624	64,526
1969-70	209,387	126,146	83,241	135,351	74,036
1970-71	231,486	138,590	92,896	152,305	79,181
1971-72	252,774	150,085	102,689	167,949	84,825
1972-73	264,525	155,000	109,525	175,220	89,305
1973-74	278,259	158,344	119,915	185,504	92,755
1974-75	293,651	162,115	131,536	194,666	98,985
1975-76	313,001	167,745	145,256	207,209	105,792
1976-77	318,241	168,210	150,031	209,689	108,552
1977-78	312,816	161,708	151,108	202,891	109,925
1978-79	302,075	153,772	148,303	192,683	109,392
	Projections				
1979-80	315,090	155,130	159,960	na	na
1980-81	315,850	152,710	163,140	na	na
1984-85	313,240	152,780	160,460	na	na

Note: Data prior to 1979-80 are for aggregate U.S. (fifty states, D.C., and outlying parts) except where footnoted otherwise; projections are intermediate projections for the fifty states and D.C. Tables showing percent distribution are found on pages 152 and 153.

na Not available.

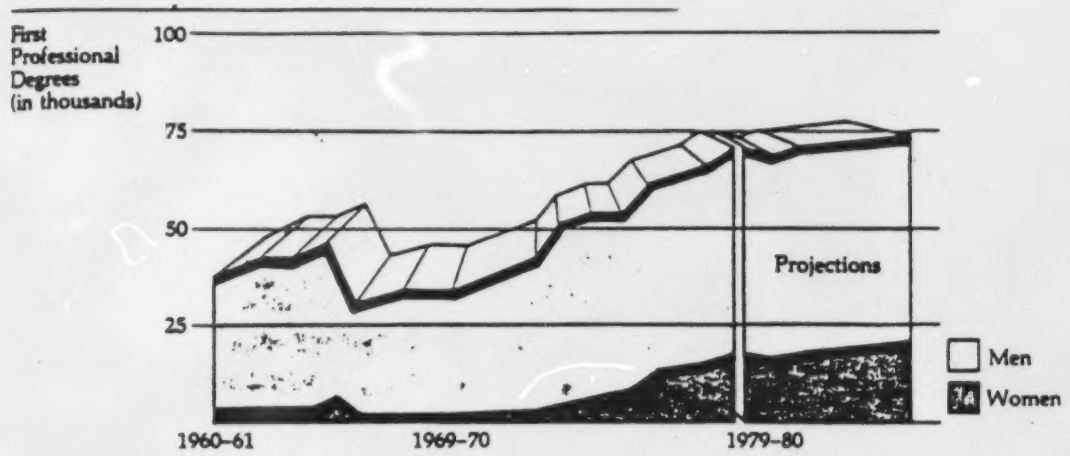
a Figures for 1947-48 through 1964-65 generally exclude those master's degrees that are considered first professional degrees, such as master of library science and master of social work. Data for 1965-66 and later include all master's degrees.

Sources:

1 USOE/NCES earned degree series. See page 145.

2 NCES, *Projections of Education Statistics to 1988-89* (Washington: GPO, 1980), p. 62.

TABLE 14. First Professional Degrees, by Sex of Student and by Control of Institution, Selected Years, 1960-61, 1984-85.



Year	First Professional Degrees[a]				
	Total	Men	Women	Public	Private
1960–61	36,447	32,473	3,974	12,846	23,601
1961–62	37,663	33,570	4,093	13,239	24,424
1962–63	40,171	35,642	4,529	15,029	25,142
1963–64	41,637	36,692	4,945	15,873	25,764
1964–65	45,946	39,893	6,053	18,111	27,835
1965–66	31,496	30,071	1,425	12,474	19,022
1966–67	32,493	31,064	1,429	13,278	19,215
1967–68	34,728	33,083	1,645	14,526	20,202
1968–69	35,681	34,069	1,612	15,038	20,643
1969–70	35,252	33,344	1,908	14,733	20,519
1970–71	38,276	35,797	2,479	16,341	21,935
1971–72	43,774	41,021	2,753	18,727	25,047
1972–73	50,435	46,827	3,608	22,104	28,331
1973–74	54,278	48,904	5,374	23,474	30,804
1974–75	56,259	49,230	7,029	23,907	32,352
1975–76	63,061	53,210	9,851	26,092	36,969
1976–77	64,780	52,668	12,112	26,669	38,111
1977–78	66,964	52,553	14,411	27,408	39,556
1978–79	69,222	52,909	16,313	28,103	41,119
	Projections				
1979–80	68,450	52,540	15,910	na	na
1980–81	69,560	53,030	16,530	na	na
1984–85	72,860	53,330	19,530	na	na

Note: Data prior to 1979–80 are for aggregate U.S. (fifty states, D.C., and outlying parts) except where footnoted otherwise; projections are intermediate projections for the fifty states and D.C. Data showing bachelor's degrees apart from professional degrees were not gathered by the U.S. Office of Education prior to 1960–61. Tables showing percent distributions are found on pages 152 and 153.

na Not available.

a For 1960–61 through 1964–65, data are for first professional degrees that required five or more years of study, plus master's degrees that were considered first professional degrees, such as master's degrees in library science, social work, and public administration; for 1965–66 and later, data show only those first professional degrees based on programs which required at least two years of college work for admission and a total of six or more years of work for the degree. For 1965–66 and later, *all* master's degrees, whether or not they were first professional, were to be reported as master's degrees and are excluded from these data.

Sources:

1 USOE/NCES earned degree series. See page 145.

2 NCES, *Projections of Education Statistics to 1988–89* (Washington: GPO, 1980), p. 62.

TABLE 15: Earned Degrees Conferred, by ethnicity, 1975-76 and 1978-79.

Master's Degrees	Total	American Indian	Asian or Pacific Islander	Black Non-Hispanic	Hispanic	Total Minority	Non-Resident Alien	White Non-Hispanic
1975-76								
number	310,470	795	4,037	20,351	6,356	31,539	16,080	262,851
percent	(100)	(0.3)	(1.3)	(6.6)	(2.0)	(10.2)	(5.2)	(84.7)
1978-79								
number	300,870	999	5,518	19,397	6,459	32,373	19,405	249,092
percent	(100)	(0.3)	(1.8)	(6.4)	(2.1)	(10.8)	(6.4)	(82.8)

Doctor's Degrees	Total	American Indian	Asian or Pacific Islander	Black Non-Hispanic	Hispanic	Total Minority	Non-Resident Alien	White Non-Hispanic
1975-76								
number	33,799	93	583	1,213	407	2,296	4,068	27,435
percent	(100)	(0.3)	(1.7)	(3.6)	(1.2)	(6.8)	(12)	(81.2)
1978-79								
number	32,678	104	811	1,267	453	2,635	3,915	26,128
percent	(100)	(0.3)	(2.5)	(3.9)	(1.4)	(8.1)	(12)	(80)

TABLE 15.(continued) Earned Degrees Conferred, by ethnicity, 1975-76 and 1978-79.

First-Professional Degrees

	Total	American Indians	Asian or Pacific Islander	Black Non-Hispanic	Hispanic	Total Minority	Non-Resident Alien	White Non-Hispanic
1975-76								
number	62,494	205	962	2,694	1,469	5,330	829	56,335
percent	(100)	(0.3)	(1.5)	(4.3)	(2.4)	(8.5)	(1.3)	(90.1)
1978-79								
number	68,985	216	1,205	2,836	1,655	5,912	641	2,432
percent	(100)	(0.3)	(1.7)	(1.7)	(2.4)	(8.6)	(0.9)	(90.5)

SOURCE : 1975-76 data adapted from U.S. Department of Health, Education, and Welfare, Office of Civil Rights, Data on Earned Degrees Conferred from Institutions of Higher Education by Race, Ethnicity, and Sex, Academic Year 1975-76, April, 1978. 1978-79 data adapted from American Council on Education Fact Book for Academic Administrators, 1981-82,pp. 163-165. The 1978-79 data reported in the Fact Book were derived from the Office of Civil Rights.

TABLE 16. Percent of doctoral recipients holding a temporary visa.

Year of Doctorate	Total	Men	Women
1960	9.2	9.3	8.2
1961	10.1	10.3	8.4
1962	10.8	11.1	8.3
1963	9.8	10.1	7.6
1964	10.2	10.5	8.1
1965	10.7	11.2	6.9
1966	10.6	11.0	8.0
1967	10.0	10.3	8.1
1968	9.9	10.4	6.4
1969	9.1	9.5	6.3
1970	8.7	9.2	5.6
1971	8.4	9.0	5.0
1972	8.6	9.3	4.9
1973	9.4	10.4	4.9
1974	10.2	11.3	5.4
1975	10.7	12.4	4.9
1976	10.7	12.4	5.3
1977	10.9	12.6	5.6
1978	11.1	13.2	5.5
1979	11.5	13.9	5.5
1980	11.7	14.5	5.2

SOURCE: Adapted from the National Research Council, Summary Report, 1980.

TABLE 17.

TABLE I

Average Applications, Admit Offers, and Matriculants by Area of Study

	1972	1973	1974	1975	1976	1977	1978	1979	1980	Years 72-80
Applications:										
Social Sciences	202	208	185	178	175	164	158	150	146	174
Science	110	109	116	115	122	122	118	113	112	115
Engineering	132	133	140	160	170	174	190	212	229	171
Humanities	130	129	123	109	105	89	81	76	69	101
Admit Offers:										
Social Sciences	50	53	50	53	50	49	48	49	48	50
Science	53	50	54	52	50	49	51	49	50	51
Engineering	79	86	88	95	111	98	113	114	105	99
Humanities	49	45	43	40	40	34	32	31	30	38
Matriculants:										
Social Sciences	20	20	19	20	19	18	18	18	18	19
Science	17	17	18	18	18	18	17	17	16	17
Engineering	29	30	35	35	42	40	43	46	44	38
Humanities	18	18	16	15	15	14	14	13	12	15
Admit Offers/Applications										
Social Sciences	0.25	0.25	0.27	0.30	0.29	0.30	0.30	0.33	0.33	0.29
Science	0.48	0.46	0.46	0.45	0.41	0.40	0.43	0.43	0.44	0.44
Engineering	0.60	0.64	0.63	0.59	0.65	0.56	0.60	0.54	0.46	0.59
Humanities	0.38	0.35	0.35	0.36	0.38	0.38	0.39	0.41	0.43	0.38

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TABLE 18. DOCTORATE-GRANTING INSTITUTIONS

FULL-TIME GRADUATE SCIENCE STUDENTS, BY TYPE AND SOURCE OF MAJOR SUPPORT: FALL 1976-80

NATIONAL SCIENCE FOUNDATION SURVEYS

Number of Institutions Surveyed	292	296	314	320	328
TYPE AND SOURCE OF MAJOR SUPPORT	FALL 1976[1]	FALL 1977[2]	FALL 1978	FALL 1979[3a]	FALL 1980[3b]
FELLOWSHIPS & TRAINEESHIPS	37,732	39,414		39,071	38,970
Federal Support	18,995(50%)	19,745(50%)		19,313(49%)	18,451(47%)
Institutional Support	11,497(30%)	11,899(30%)		12,750(33%)	12,787(33%)
Other Outside Support	7,250(19%)	7,770(20%)		7,008(18%)	7,732(20%)
RESEARCH ASSISTANTSHIPS	42,811	43,991		48,416	50,914
Federal Support	24,415(57%)	25,155(57%)		27,841(58%)	29,095(57%)
Institutional Support	13,968(33%)	14,208(32%)		15,034(31%)	16,066(32%)
Other Outside Support	4,428(10%)	4,628(11%)		5,541(11%)	5,753(11%)
TEACHING ASSISTANTSHIPS	48,685	48,837		49,556	51,787
Federal Support	567(1%)	606(1%)		549(1%)	611(1%)
Institutional Support	47,802(98%)	47,923(98%)		48,634(98%)	50,866(98%)
Other Outside Support	316(1%)	308(1%)		373(1%)	310(1%)
OTHER TYPES OF SUPPORT	86,127	85,984		86,384	88,930
Federal Support	4,531(5%)	4,802(6%)		5,171(5%)	4,695(5%)
Institutional Support	6,327(7%)	6,478(7%)		6,411(7%)	7,003(8%)
Other Outside Support	5,731(7%)	5,735(7%)		7,118(8%)	7,298(8%)
Self-Support	69,538(81%)	68,969(80%)		67,684(78%)	69,934(79%)
TOTALS 887,609	215,355	218,226		223,427	230,601

NO DATA AVAILABLE

SOURCE: Prepared by COFHE Graduate Research Project. (See following page for detailed sources.)

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TABLE 1g. (continued) FOOTNOTES

[1] Graduate Science Education: Student Support and Postdoctorals. Fall 1976. Detailed Statistical Tables. Appendixes III, IV and V. Surveys of Science Resources Series. National Science Foundation, Washington, D.C. 20550 NSF 77-319.

Numbers reported here are from Table B-11 (p. 31) Full-time graduate students in all doctorate-granting institutions, by level of study and source and type of major support: 1976.

[2] Graduate Science Education: Student Support and Postdoctorals. Fall 1977. Technical Notes and Detailed Statistical Tables. Surveys of Science Resources Series. National Science Foundation, Washington, D.C. 20550. NSF 78-315.

Numbers reported here are from Table B-11 (p. 46) Full-time graduate students in all doctorate-granting institutions, by level of study and source and type of major support: 1977.

[3] Academic Science. Graduate enrollment and support. Fall 1980. Surveys of Science Resources Series. National Science Foundation. Detailed Statistical Tables. NSF 81-330.

a) Numbers reported here are from Table C-31 (p. 101) Full-time science/engineering graduate students in doctorate-granting institutions by type and source of major support: 1974-77 and 1979-80.

b) Numbers reported here are from Table I.1 (p. 2) The NSF data collection series: 1974-80.

TABLE 19. Major Federal Fellowships 1980-81

NAME AND PURPOSE[a]	FIELD	NUMBER[b]	FUNDING LEVEL (in millions)
NATIONAL SCIENCE FOUNDATION (NSF) (Science personnel and dissertation improvement)	Natural and social sciences	1,530 (150 for minorities)	$11.8
GRADUATE AND PROFESSIONAL OPPORTUNITIES PROGRAM (GPOP) (for minorities and women)	All, but determined by "national need"	1,011	$8.5
FOREIGN LANGUAGE AND AREA STUDIES (FLAS)	Foreign languages	800	$4.5
FULBRIGHT EXCHANGE PROGRAM (International Communication Agency)	All	350	$3.3
PUBLIC SERVICE AWARDS	Public affairs	339	$2.8
NATIONAL RESEARCH SERVICE AWARDS (NRSA)[c] (ADAMHA of NIMH)	Social, behavioral, biological sciences	125[d]	$1.3
DOMESTIC MINING	Geology	549	$4.5
FULBRIGHT-HAYS DOCTORAL DISSERTATION RESEARCH ABROAD	Foreign language, area studies	800	$4.6
DEPARTMENT OF LABOR (Doctoral dissertations on employment and training)	Economics	47	$.5
DEPARTMENT OF JUSTICE	Social sciences	6	$.03[e]
SMITHSONIAN INSTITUTE RESEARCH FELLOWSHIPS (for doctoral dissertations)	All	25[f]	$.2
	TOTAL	5,584	$42.8

SOURCE: See following page.

TABLE 19 (continued).

[a]The list omits fellowships in the arts and architecture (a trivial number), business and engineering (a fair number in two agencies), and special education (a large program for teachers of the handicapped).

[b]Includes new starts and continuing, e.g. of 1,536 NSF fellowships approximately 500 are new starts.

[c]A number of other fellowship programs and traineeships exist within the Department of Health and Human Services for which students in health-related programs or sub-specialties are eligible, but it would be deceptive to list these as generally available to graduate students in the natural and social sciences.

[d]Number and funding level estimated.

[e]Estimated.

[f]Omits 22 for visiting students for whom $22,000 of the approximately $.2 million is designated.

NOTE: The programs are listed in descending order, from those with a more or less broad purpose to those with a specific purpose and from those that are available to beginning students to those reserved for the most advanced, with some attention to the magnitude of the program.

SOURCE: Original data tabulated as part of a Work-Study project supervised by Nan S. Wells (Princeton University), as reported in Anderson, R.B., "Financial Assistance for Graduate Students: 1980 and Beyond," 1981.

APPENDIX D

DOCUMENTATION FOR SURVEY of the TYPES, SOURCES, and DISSEMINATION of SUPPORT for GRADUATE EDUCATION at GRADUATE RESEARCH PROJECT INSTITUTIONS of the CONSORTIUM on the FINANCING of HIGHER EDUCATION as PRESENTED on 1979-80 BAR GRAPHS

Collection of the Data

Several of the institutions had participated in previous studies where the information had been obtained on site visits. This experience made it possible to develop a survey instrument to supplement the source documents provided by the institutions. Multiple telephone calls were needed in all cases to augment and clarify these documents. On September 18, 1981, a memorandum telling how the source data had been manipulated was sent to each institution. A subsequent telephone survey revealed no complaints about the particularities and only minor dissonance about the generalities.

Manipulation of the Data

There was a priori agreement that the participating institutions share a common set of characteristics (organization, quality of students, curriculum, faculty and price) and a similar set of concerns.

However, the more microscopic the institutional scrutiny, the less comparable the institutions seemed. The resolution--to paint the financial support picture in broad strokes using aggregate data--cannot claim unanimous approval but it placed the project in the realm of the "difficult but possible" rather than "definitive but unattainable." Definitions were established to balance efficient summarization of data with maximum achievement of detail.

Definitions

Graduate students are those enrolled in academic programs leading to a doctorate or a master's degree in the humanities, the visual and performing arts, and the natural, physical, and social sciences. Programs in Architecture, Education, Engineering, and the basic medical sciences ordinarily fall into one of these categories. Professional students (Law, Dentistry, and Medicine) are excluded as well as graduate-professional students in certain programs (MSW, MBA, etc.) where possible.

Fall term enrollment consists of headcounts, not FTEs. The same is true for headcounts under support categories (Princeton may not have followed that rubric). Students who are in some kind of off-campus enrollment status and who are

not eligible for support are excluded from the enrollment counts.

Living expenses reflect a 12-month budget for a single student with no dependents; it is the official institutional budget for federal lending purposes and includes a book allowance for two terms or three quarters.

Tuition and fees are calculated on the basis of the number of students paying various rates (in one case as many as 11 categories) for two terms or three quarters. Average tuition is the various rates, multiplied by the number of students paying these rates, divided by the Fall enrollment.

Student support consists of those financial resources which are available through the agency of the institution during the fiscal year. It takes the form of tuition awards and stipend payments or whatever combination of these is dictated by the culture of the institution.

Accounting system typologies at all the institutions permit dividing funds into roughly three groups, all of which are used as sources of support for graduate students: 1) General Funds are those deriving from fee income, indirect cost recovery, cost of education funds (the institutional allowances associated with the administration of federal fellowships and traineeships), state allocations, etc.[1] Some graduate schools refer to these as "operating funds from the central administration"; 2) Expendable Restricted Funds (Private Funds) derive from endowments, industry and foundations; 3) Federal Funds are self explanatory.

The types of student support are the broad ones common to all institutions. Assistantships are service-related awards. Teaching Assistantships derive from General Funds; with almost no exceptions Research Assistantships derive from Expendable Restricted and Federal funds. Assistantships funded through the Federal College Work Study program are included.

Fellowships are non-service related awards and are funded from all three funding sources. Minority fellowships are that portion of General Fund support which is designated for ethnic minorities. Private fellowships are funded only through Expendable Restricted Funds and include awards such as Danforth, Social Science Research Council, etc. Federal fellowships and traineeships are those portable and institutional awards offered by such agencies as the

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[1] General Funds derive, in part, from Private Funds (the endowment) at the private schools. In the future this distinction will be made.

National Institutes of Health, the National Science Foundation, the Graduate and Professional Opportunities Program for Minorities and Women, etc.; they exclude College Work Study and federal loans. General Funds fellowships include, for the private schools, endowment funds flowing from the central administration.

Loans are predominantly federally funded but all types are included.

Financial requirements include living expenses and tuition and fees. Financial resources include all types of student support. Personal resources is the difference between financial requirements and financial resources.

Discussion of Definitions

Graduate students at Berkeley include those in Architecture, Business Administration, Law, Public Health and Social Work; at Cornell include those in Agriculture and Veterinary Medicine; at North Carolina include those in Social Work and exclude those in Engineering; at Columbia exclude those in Education.

Fall term enrollment is a commonly used surrogate for academic year enrollment. Unduplicated counts of actual academic year enrollment are nearly impossible to obtain for most institutions. Fiscal year enrollments differ significantly from academic year enrollments only for the subset of institutions with full summer programs. (Berkeley, the largest institution in the project, does not have a Summer term comparable to Fall and Winter, whereas Michigan has a full trimester.)

Full time enrollment lacks definition at some institutions, has varying interpretations at others (e.g. it can be different for federal lending purposes and Veterans Administration benefits), and is the rule at others. Headcounts are a defensible substitute since living expenses should be calculated by headcount (part-time students eat full-time).

Cornell and Washington gave tuition rates for part-time students; full-time status was assumed for students at other institutions. This assumption is justified since there is reason to believe that with sufficient support most students would enroll full-time and headcounts and FTEs would approximate each other.

Duplication of headcounts across support categories appears to be an unavoidable problem resulting from the variety of ways in which institutions dispense financial support.

Living expenses could have been equalized--or adjusted by Bureau of Labor Statistics standards. Experiments along this line did not substantially alter the comparative results and did not warrant abandoning the actual budgets.

Average tuition minimizes the cost difference between the private and public institutions in a manner entirely faithful to the facts. For instance, despite nearly a thousand dollar difference between Harvard's and Michigan's "high" tuition rates, Michigan's average tuition approximates Harvard's.

Student support excludes direct payments to students unless the institution is accountable for the payments (and therefore knows about them). Thus direct payments, e.g. to foreign students by their governments and to students by their employers, are included in personal resources on the assumption that, in most cases, the money arrives by U.S. Mail or is deposited directly in the bank and the graduate school remains external to the process.

Student support in the form of full tuition awards and stipend payments is the rule at some institutions and the exception at others. Michigan, for instance, rarely gives full tuition awards even to teaching assistants.

Tuition awards are considered entirely fictitious support at Yale, Princeton, and Johns Hopkins since their awards keep pace with tuition increases. Other institutions feel equally strongly that it would be unfair and inaccurate to disregard tuition as a real cost to students and real support from the institutions.

Tuition awards are ordinarily not paid directly to the student since they are usually a book transfer of institutional funds or, in some instances, state waivers, or, as at Columbia and Cornell some combination of individual student and institutional payment (New York State Tuition Assistance Program).

Stipend payments are usually presented to the student recipient in the form of a payroll check--although, if the need arises, a check may be suppressed in favor of a transfer to cover campus housing charges, delinquent payments to the institution, etc.

Payments to students who are employed in job classifications primarily filled by non-students are excluded. This information is generally not retrievable and the academic institution may be viewed as just another enterprise where graduate students work, like McDonald's or a local bookstore.

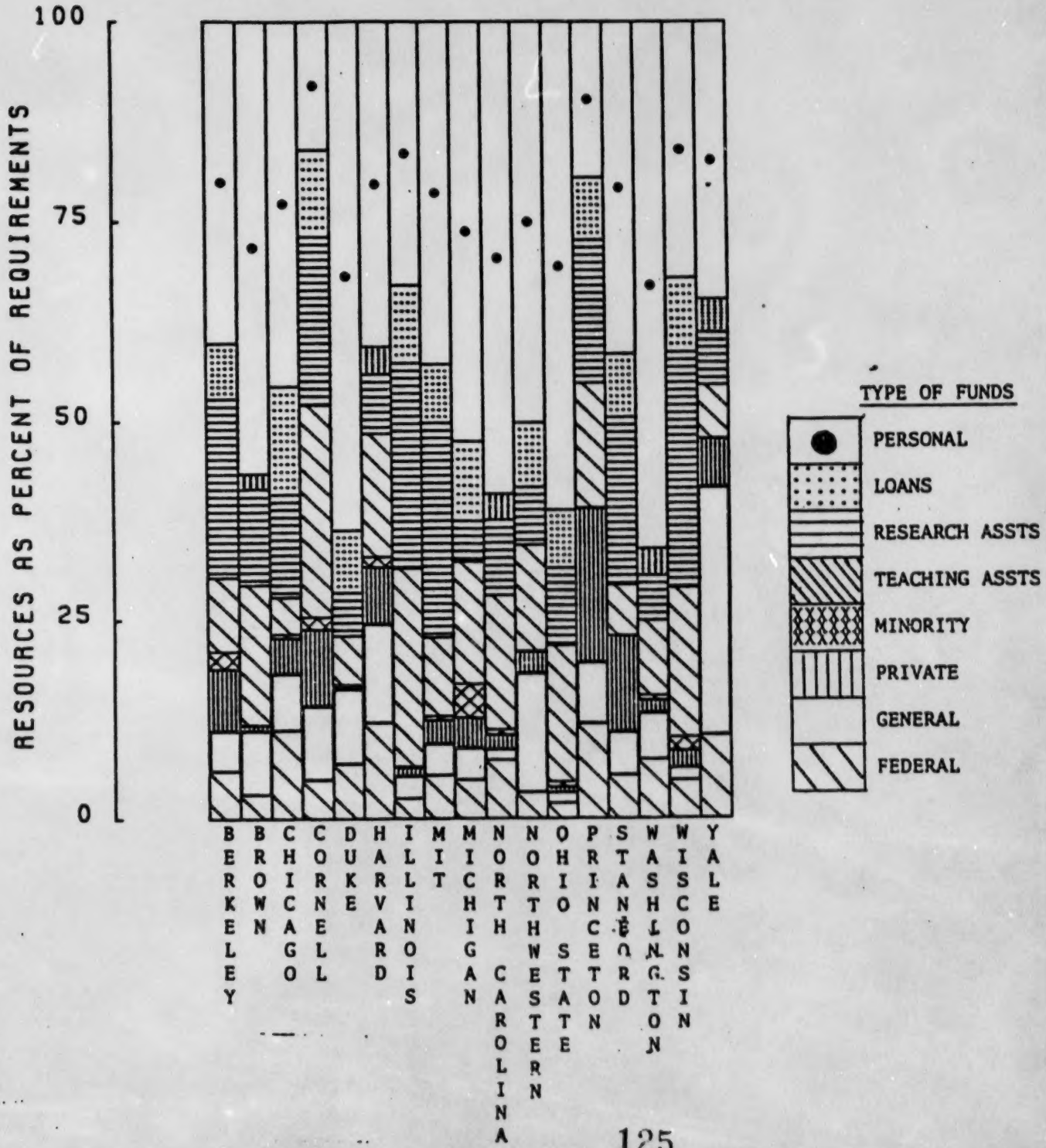
Presentation of the Data

The issue of inter-institutional comparability is complicated at this point by the need to graphically present the data so that distortions are not introduced by the varying size of the enrollments, the range of expense budgets, and the apparent discrepancy in tuition levels between the public and private institutions. The data are presented as the financial requirements of a hypothetical Fall term student body with identical characteristics (single without dependents); they represent the price tag for the next twelve months during which books, tuition and fees will need to be paid during the academic year (two terms or three quarters as the case may be) and food, housing and other living costs met for the entire period.

Three types of graphs were constructed in which financial requirements at each institution were presented as a single bar. Each bar was marked off incrementally according to the type and amount of institutional support available. The percentage graph has as the top line one hundred percent of the financial requirements of the student body particular to each institution; financial resources are calculated as percentages of this total. The average requirements graph has as the top line for each bar the average requirements per student; financial resources constitute fractions of this bar. The total requirements graph has as the top line for each bar the total requirements of the institution's Fall term students. The graphs are accompanied by tables giving the numbers associated with the graphs (the numbers are, of course, the same for all three graphs; only the method of presentation differs). The footnotes to the tables give the algorithm for the computation of the graphs.

Which graph is preferable depends entirely on an assessment of what message should be conveyed and to what audience it should be addressed. The percentage graph shows no institution coming close to supporting its graduate students. In emphasizing that it is e.g., twice as expensive to attend M.I.T. as North Carolina, the format of the average requirements graph does not serve the private schools well in a debate over increased funding. The total requirements graph reflects mainly the sizes of the institutions.

GRADUATE STUDENT SUPPORT, 1979-80



Financial Requirements for Graduate Students, 1979-80
at Selected Institutions

Institution	Fall Enrollment	Living Expenses	Average Tuition	Dollars per Student	
				Required	Available
Berkeley	8928	$4,957	$1,432	$ 6,389	$3,818
Brown	1196	5,700	5,540	11,240	4,994
Chicago	2388	4,955	4,309	9,264	5,038
Cornell	3540	5,100	3,982	9,082	7,627
Duke	1626	5,944	2,117	8,061	2,927
Harvard	2455	6,300	2,493	8,793	5,342
Illinois	7256	4,918	1,637	6,555	4,396
M.I.T.	3988	6,400	5,300	11,700	6,685
Michigan	6680	4,695	2,767	7,462	3,546
North Carolina	3762	4,153	1,468	5,621	2,300
Northwestern	2066	6,883	4,225	11,108	5,542
Ohio State	9745	5,457	1,668	7,125	2,768
Princeton	1453	5,300	5,251	10,551	8,486
Stanford	4922	5,400	3,675	9,075	5,300
Washington	1032	5,855	3,208	9,063	3,079
Wisconsin	9068	3,979	2,470	6,449	4,380
Yale	2111	5,391	4,063	9,454	6,175

Note: "Graduate Students" are hypothetical unmarried individuals with no dependents, who enroll for two terms or three quarters. "Living Expenses" is a 12-month budget for such a student; it includes a book allowance for two terms or three quarters. "Average Tuition" is the various tuition rates (including any mandatory fees), multiplied by the numbers of students paying these rates, divided by the Fall enrollment. "Required Dollars per Student" is Living Expenses plus Average Tuition. "Available Dollars per Student" is based on the table titled "Financial Resources for Graduate Students, 1979-80."